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ON CICUTA MACULATA, OR WATER HEMLOCK.

By JOSEPH EVANS YOUNG.

(An Inaugural Essay presented to the Philadelphia College of Pharmacy.)



Flowering branch of *Cicuta maculata*.

BOTANICAL DESCRIPTION.—*Sex. Syst.* Pentandria digynia.
Nat. Ord. Apiaceæ or Umbelliferae.

GEN. CH.—Partial involucre, leaves ternate and pinnate. Fruit orbicular, tenfurrowed.

The *Cicuta maculata* is an umbelliferous plant, inhabiting wet meadows and the banks of streams, from the northern to the southern limits of the United States, flowering in July and August.

The root is composed of a number of large, oblong, fleshy tubers, diverging from the base of the stem, which are frequently found of the size and length of the finger; distinct cells or cavities are to be found on various parts of the bark, which are filled with a resinous juice of a yellow color. The plant is from three to five feet in height, with a smooth stem, branched at the top, hollow-jointed, striated, and generally of a purple color, except when the plant grows in the shade, in which case it is green. The leaves are compound, the largest being about three times pinnate, with the exception of the uppermost, which are ternate. Most of the petioles are furnished with large obtuse stipules, which clasp the stem at their base. The leaflets are oblong acuminate, serrate, with very acute serratures. The flowers grow in umbels of a medium size, without a general involucre, the partial umbels are furnished with involucres of very short, narrow, acute leaflets. The calyx is composed of five very minute segments. There are five white, obovate petals, with inflated points. The fruit is very nearly orbicular and compressed, with ten furrows, crowned at top, and separating into two semicircular seeds.

Chemical History.—A cold infusion made from the seeds by maceration and displacement was of a dark brown color, and gave an acid reaction with litmus.

Albumen.—The cold infusion was coagulated by heat, showing the presence of albumen.

Tannic Acid.—When the tincture of muriate of iron is added to the cold infusion, a greenish-black precipitate is produced, and a solution of gelatin is also readily coagulated by it, showing the presence of tannic acid.

Gum.—To an infusion made with boiling water a solution of subacetate of lead was added till it ceased to produce a precipitate; this was suspended in water, and the lead removed by a current of hydrosulphuric acid; on evaporating the filtered solution to dryness, a substance was left which was soluble in water

but not in alcohol, and which yielded mucic acid by the action of nitric acid.

Fixed Oil.—A portion of the bruised seeds was treated with ether, and the resulting tincture evaporated, until it ceased to have weight, when about five per cent. of a very thick, greenish, greasy matter was obtained, consisting chiefly of fixed oil, with resin and chlorophylle.

Resin.—An ethero-alcoholic tincture was made by displacement, and evaporated to a syrupy consistence, then thrown into water, when about three per cent. of impure resin was precipitated.

Volatile Oil.—One pound of the bruised seeds were distilled with water acidulated with sulphuric acid; seven per cent. of a colorless, very limpid volatile oil passed over, having an insipid, oily taste, and an odor very analogous to that of oil of *Chenopodium anthelminticum*; has a specific gravity of .853, and boils at 360° F., without undergoing any change; is soluble in alcohol, ether and chloroform; it dissolves a large quantity of sulphur by heat, and deposits most of it in crystals on cooling; phosphorus is also readily taken up by the oil, with the aid of heat, and also crystallizes on cooling; sulphuric acid decomposes and blackens the oil with the evolution of heat; muriatic acid gas passed through it is largely absorbed, and decomposes the oil, changing its color to a dark brown, without any deposition of resin; and the same reaction takes place with chlorine.

Nitric acid acts on it powerfully. When added to the oil an explosion follows, by which most of it is thrown from the vessel, the residue, on standing a few hours, deposits a thick resinous matter, heavier than water, which, when well washed with warm water, and distilled with potassa, afforded a substance having a very agreeable aromatic odor. The volatile oil of *Cicuta maculata* is neutral to test paper, but rapidly ozonizes air enclosed with it in glass bottles exposed to the light, and in this respect it is more active than oil of turpentine. The corks of the vials containing it are bleached as though acted on by nitric acid, and when a slip of paper moistened with iodide of potassium and starch water is suspended in a vial above the oil, the iodide is instantly decomposed, setting free the iodine, showing the pre-

sence of a large quantity of ozone in the atmosphere of the vial.

When treated with bichromate of potassa and sulphuric acid it yielded by distillation an acid analogous to formic acid.

Potassium, when added to the oil, decomposes it with effervescence, materially affecting its odor, and on standing causing it to become solid; the potassa formed from the oxidation of the potassium, uniting with a portion of the oil to form a compound-like resinate of potassa, having a dark brown color and a soft solid consistence.

About two drachms of the crude oil was treated with potassium until reaction ceased, when it had assumed a dark brown color, and thick consistence; the whole, with a portion of potassium, was introduced into a retort, and by a careful application of heat, a colorless hydrocarbon oil distilled over, of the sp. gr. .830, having a pleasant odor, and a bland aromatic taste; it is rendered dark red by the action of sulphuric acid; caustic potassa digested in the oil does not affect it; nitric acid acts on it with effervescence but without exploding.

Caustic potassa added to the crude oil changed it, after standing, into a solid of a dark red color, (the odor was similar to that produced by the action of potassium,) this was treated with water and filtered, a few drops of the solution of subacetate of lead was added to the filtrate, but it did not produce a black precipitate. Iodine combines slowly but perfectly, without explosion, becoming colorless on standing. A few drops of the volatile oil were placed on a watch glass, and exposed to oxygen gas under a bell jar for two or three weeks, without any apparent change in its consistence or color taking place.

Conia.—From the close botanical relationship between *Cicuta maculata* and *Conium maculatum*, and its known poisonous properties, it was presumed that a volatile alkaloid existed in the former, analogous, if not identical with conia. To decide this question, a portion of the seeds were bruised and macerated in diluted alcohol, acidulated with sulphuric acid for four or five days and displaced; the resulting tincture was evaporated to the consistency of honey, and treated with a mixture of alcohol and ether. This was also evaporated, and a portion of water added in order to dissolve the salt of the alkaloid, and leave the resin. A small

quantity of caustic potassa was then added to the solution, and the mixture distilled; the distillate had the strong mouse-like odor peculiar to conia, and was slightly ammoniacal. It produced a white precipitate with an infusion of galls, (tannate of conia,) and a white one with a few drops of a weak tincture of iodine. Part of the distillate was saturated with sulphuric acid and evaporated to dryness. The crystalline mass was treated with alcohol of 97 per cent., which left a residue of sulphate of ammonia. The alcoholic solution by evaporation afforded a crystalline product, which gave off a very powerful odor of conia when a few drops of solution of potassa was added to a portion of it. If too great an excess of potassa is used in the process, it probably decomposes a considerable part of the conia, as it is well known that this alkaloid, under such circumstances, is changed. This accounts for the presence of the ammoniacal salt, which could not have come from the seeds, as sulphate of ammonia is insoluble in the ethereo-alcoholic menstruum used in the preliminary steps of the process.

The seeds contain a large portion of dark brown coloring matter, which is dissolved out by alcohol and water; and also contain chlorophylle as their color would infer, the presence of which is evinced by the ethereal tincture having a dark green color.

Two ounces of the bruised seeds were boiled with milk of lime and filtered, the lime salt thus formed with the acid was carefully decomposed by sulphuric acid, and the solution filtered. This was evaporated to dryness, and treated with warm water, to which some animal charcoal was added, and boiled, the charcoal was filtered out, and the solution again evaporated to dryness, and then treated with alcohol as long as that liquid gave an acid reaction to litmus. This was also evaporated to dryness, and dissolved in water, which solution, on being evaporated in a capsule, deposited the acid in a crystalline form, which I presume is the substance found by Peschier in *Conium maculatum*, and designated by him as conic acid. It is soluble in alcohol, ether and water, and is carbonized and destroyed by heat. The solution of subacetate of lead is precipitated; this acid and the lead salt when dissolved by nitric acid, is not precipitated by chloride of barium.

From the foregoing experiments the seeds of *Cicuta maculata*

contain albumen, tannic acid, gum, fixed oil, resin, volatile oil, chlorophylle, coloring matter, conia, and a peculiar acid, probably the coniiic acid of Peschier. The tops and leaves were treated in the same manner as the seeds for conia, but it existed in such a small quantity that I could only detect it by the odor, and by the production of white vapors when subjected to the action of hydrochloric acid gas.

The flowers when immersed in water and subjected to distillation, yielded a very small quantity of volatile oil, analogous to that obtained from the seeds.

The cicuta root, in taste and odor, very much resembles the common parsnip. In drying, three-fourths of its weight is dissipated in moisture. The hot infusion, when treated with solution of acetate of lead does not sustain any reaction; but the presence of starch is indicated in the same by a bluish black precipitate, when treated with the tincture of iodine. The presence of conia could not be detected in the root, but this may be accounted for by the fact, that the specimen examined was collected late in October, when the vital force of the plant had probably been exhausted in seed bearing.

PREPARATION OF CITRATE OF IRON AND QUINIA, AND ITS CONSTITUENTS.

By EDWARD R. SQUIBB, M.D. Passed Assistant Surgeon, U. S. Navy.*

The experience of this laboratory with these preparations having become sufficiently definite to be useful, I offer the formulæ to the Journal for publication, under the conviction that the irregularity and uncertain constitution of the commercial article prevents a proper appreciation of the value of citrate of iron and quinia.

I have made this preparation seventeen times, in quantities varying between one ounce and five and a half pounds at a time. The proportions adopted in the formulæ are the result of experiment and practice, and were verified by calculation afterwards.

For general pharmaceutical application the formulæ are all

[* Dr. Squibb is the Assistant Director of the United States Naval Laboratory at Brooklyn.—EDITOR.]

based upon 480 grains of crystallized sulphate of iron; yet no particular modification of proceeding, or of time required in heating, digesting, &c., is necessary, if the proportions be not multiplied beyond five times.

The sulphate of protoxide of iron used was well crystallized and free from efflorescence, was in masses near the size of a filbert, dry externally, but affording a moist granular powder, adhering round the pestle and mortar when rubbed up. When rubbed up and dried for half an hour at 85°, efflorescence being avoided as far as practicable, 480 grains lost 16; and this was probably near the index of the accidental water. The salt was of a good greenish blue color, with but slight stains from peroxidation, and was made from the turnings of wrought iron, and the residue of the ether process.

The sulphuric acid used was the commercial acid, s. g. 1.855, but contained a larger proportion of sulphate of lead than usual.

The nitric acid used was pure, as obtained by redistilling the commercial acid and rejecting the first portions. It had the usual density of acid so obtained, viz., s. g. 1.41.

The solution of ammonia was of the officinal, [U. S. P.] and not the commercial strength.

The citric acid was the ordinary crystalline masses; and the sulphate of quinia that of Powers & Weightman, of Philadelphia.

Hydrated Peroxide of Iron.

Take of Sulphate of iron,	3℥.
Sulphuric acid,	grs. 86, or ℥ 47.
Nitric acid,	grs. 90, or f. 3℥.
Solution of ammonia	f. 32, f. 3℥.
Distilled water,	q. s.
Water,	q. s.

To f. 34 of distilled water in a six ounce beaker, add the sulphuric acid and heat the mixture in a water bath. Then add successively the nitric acid and sulphate of iron in crystals, and heat the whole with occasional stirring for an hour and a half, supplying the loss by evaporation with distilled water. Dilute the solution with two parts of distilled water and filter it into a half gallon beaker, and wash the filter through with f. 310 of distilled water. Then add the solution of ammonia and stir till a smooth equable mixture is formed, when the vessel is to be filled

up with water and again stirred. When the precipitate shall have subsided, decant the supernatant liquid and again fill up the vessel with water and stir the mixture. Repeat this washing the precipitate four times, or until the washings give no cloudiness with solution of chloride of barium. Then transfer the oxide to a strainer, and drain it till it can be heaped up with a spatula. It will then weigh about $34\frac{1}{2}$, and if dried by sulphuric acid under a bell glass will yield 174 grains of terhydrated sesquioxide of iron. Or if dried on a sand bath and subjected for 15 minutes to a red heat, it will yield 134 grains of sesquioxide of iron. The yield, by calculation, from 480 grains, $\text{Fe O}, \text{SO}_3 + 7 \text{HO}$, should be 184.747 grs. $\text{Fe}_2 \text{O}_3 + 3 \text{HO}$, or 138.128 grs. $\text{Fe}_2 \text{O}_3$.

It is better to heat the sulphuric acid and water first, and to add the sulphate of iron immediately after the nitric acid, as this avoids loss of nitric acid by evaporation. It is better also to add the sulphate at once, and in lumps as it occurs, as the effervescence is then moderate, and there is less risk of loss by spilling, or the spitting of the effervescence. Hence, also, the utility of a proportionately deep vessel, and a quantity of water so small as not to cover or embrace the whole of the salt at once. The peroxidation is probably accomplished as rapidly as the salt can be dissolved, for I have never been able to get a clear indication of protoxide in the solution, even when tested before all effervescence had ceased. During the prolonged heating, however, nitrous fumes are given off even for many hours, and long after the solution of the sulphate of peroxide of iron is perfect. An hour or an hour and a half of heating gets rid of most of this entangled or dissolved nitric oxide, and in practice seems quite sufficient to prevent its interference in the precipitation. The large dilution of the solution before precipitation is useful, for it renders the resulting precipitate more readily soluble. It is better to wash the oxide by decantation, because it is better, more easily, and much more speedily done. By decantation, with a piece of India rubber tubing as a syphon, the washing can be well performed in two hours, without any contact of air till the magma comes to be drained on the strainer. Here it invariably gets a little carbonic acid.

In making the oxide hastily as an antidote, the prolonged heating, the large dilution of the solution, and three of the wash-

ings may be omitted, as also, in case of great emergency or bad filtering paper, the filtration. The precipitate as soon as formed should be thrown into the centre of half a yard square of muslin and squeezed out twice, once from the mother liquid, and once from clear water. The antidote can be efficiently prepared from four ounces of the commonest copperas, and the solution of the sulphate of peroxide filtered before precipitation, in twenty-six minutes. This, however, is much too long to wait for an antidote, and is only recommended as a substitute in case the much better plan of Prof. Procter (see this Journal for March 1853), shall have been neglected.

Citrate of Iron.

Take of Citric acid in crystals,	grs. 330.
Magma of hydrated oxide of iron from	} 34½.
the first formula, the entire yield,	
Distilled water,	f. 34.

Warm the magma to about 150° in a six ounce beaker, in a water bath, and in the same bath dissolve the citric acid in the water in a separate vessel. Then add the acid solution to the magma and stir occasionally for three hours, maintaining a temperature between 140° and 180°, and finally filter through paper and pour the solution on plates to dry.

This process takes the oxide and acid in very nearly equivalent proportions, and yields 455 grains of dry citrate, or very nearly the sum of the *dry* acid (270.9 grs.) and the hydrated oxide (174 grs.)

The salt consists of Peroxide of iron 131 grains, or 28.8 per cent.

Citric acid,	271	"	59.56	"
Water,	53	"	11.64	"

As the acid is tribasic, and the salt strongly acid in its ordinary reactions; and as the peroxide of iron requires three equivalents of an acid to afford a normal salt, it follows that this citrate of iron is a very imperfect salt, unless water combines with its acid as a base, and also with its base as an acid.

The acid will not be saturated short of two or three hours, under the best management and frequent stirring; and, therefore, if at the end of such a period there is much turbidity or sediment in the mixture, it had better be left in a warm place over night before being filtered.

If, during the solution, the temperature rises above 205° , the process is very nearly, if not entirely, arrested before saturation; and if the solution boils, a precipitate occurs were none existed. With the proportions indicated there is always a little residue of oxide remaining on the filter, though the solution passes with facility. But where by mismanagement of the proportions, as in the formula of the Pharmacopœia, the quantity of undissolved oxide is considerable, it so clogs the filter that days are required to get a few ounces of dilute solution through good paper or muslin. While decantation is not well adapted to the separation of dark colored liquids from their sediment, and will not afford a perfectly clear solution without great loss.

It is better to dry the salt slowly, and in thicker lamina than is common, as it thus is much less bulky. A two ounce bottle is required for an ounce of thin scales; but after an ordinary transportation, these scales are found so broken up that the bottle is only two-thirds filled by them. The thicker lamina, on the other hand, require much longer time in drying, but yield a finer preparation, an ounce of which is easily put into an ounce vial.

Quinia.

Take of Sulphate of quinia that has been exposed

to a warm, dry atmosphere for 6 hours, grs. 78.

Sulphuric acid, grs. $11\frac{1}{2}$ or m. 6.

Solution of ammonia, f. $3\frac{2}{3}$.

Water, q. s.

Mix the acid with f. 36 of water, and dissolve the sulphate of quinia in the mixture by stirring. Filter the solution if necessary, and then add the solution of ammonia, and stir for ten minutes. Throw the whole upon a thick strainer and wash with a small continuous stream of water till the washings give no cloudiness with solution of chloride of barium. Allow the magma to drain to the consistence of a curdy paste and then transfer it to a vessel, or to the solution of citrate of iron as it comes from the filter.

I have weighed, at different times, the contents of 14 bottles of the sulphate of quinia of Messrs. Powers & Weightman, of Philadelphia, and found them to vary from 432 to $443\frac{1}{2}$ grains each, the total being 18 grains deficient.

The contents of a bottle weighing 442 grains, exposed in a

capsule in a moist atmosphere at 72° for one hour, lost 10 grains. In nine hours it had lost 47 grains, and then ceased to lose. It was then placed in dry air at a temperature varying from 100° to 160° , where in fourteen hours it weighed 380 grains, and ceased to lose. Exposed again under the first mentioned conditions it, in sixteen hours, weighed 395 grains.

Exposed again to dry hot air for 7 hours it weighed 377 grains.

"	"	"	moist air at 72° for 16 "	"	"	391½ "
"	"	"	hot dry air " 8½ "	"	"	377 "
"	"	"	moist air at 72° " 15 "	"	"	392½ "
"	"	"	ordinary air and temp. for 1 week, "	"	"	392 "

It was then dissolved and precipitated by the formula given when it yielded 300 grains of quinia.

The contents of another bottle, weighing 432 grains was similarly treated. In five hours it weighed 382 grains, and when precipitated and well dried, it yielded nearly 290 grains. Other bottles (three) of intermediate weights were examined in a similar way, and the mean yield of quinia from the whole was $293\frac{1}{2}$ grains to each commercial "ounce" of sulphate. Now as 436 is the equivalent number of officinal sulphate of quinia, and as there are 437.5 grains to the avoirdupois ounce, it follows that there should be about 324 grains of quinia, 40 grains sulphuric acid and 72 grains of water of crystallization in each commercial ounce. But these experiments give $293\frac{1}{2}$ grains of quinia, 36 grains of sulphuric acid, and 108 grains of water, or about 10 per cent. of uncombined water.

Hence, as a practical result, it is safe to use each commercial ounce of this sulphate of quinia as 390 grains, after 6 hours exposure to dry air. The formula takes the fifth part of this, which under ordinary management will yield 58 grains of dry quinia.

In precipitating quinia the quantity of solution of ammonia should be carefully attended to, as there is loss in using too little or too much. The washing should be carefully performed on a strainer of thick jean. A wash bottle with small orifice is well adapted to the purpose, the water being allowed to trickle from it, and being continuously distributed over the whole surface of the precipitate. In this way, the washing can be perfectly done in 15 minutes with f. 310 of water, and the loss then is small.

When the magma has drained for a few minutes, it is in a good condition for solution. If the water be wrung or pressed from it, it is liable, in a few minutes even, to contract greatly, and become glutinous and difficult to manage without loss, by parting suddenly with much of its water of hydration.

Citrate of Iron and Quinia.

When the solution of citrate of iron from the first and second formulæ has passed the filter, the magma of quinia from the third formula should be added to it, and dissolved by a few minutes stirring in the cold. The solution is then to be poured upon plates and allowed to dry slowly, being well protected from dust.

The drying thus requires six days, if in moderately thick lamina, and yields a brilliant red granular salt of a crystalline appearance.

The yield will be 495 grains of dry salt, constituted as follows:

Peroxide of iron,	131 grains,	or 26.46 per cent.
Quinia,	58 "	11.72 "
Citric acid,	271 "	54.74 "
Water,	35 "	7.07 "

It is better to add the magma to the solution of citrate of iron cold, as the quinia is thus more easily and quickly dissolved. If the solution is warmed, the quinia magma contracts and becomes sticky, requiring much more time and stirring to effect the solution.

U. S. Naval Laboratory, New York, May 7th, 1855.

REMARKS ON CASSIA MARILANDICA.

By ELLISTON L. PEROT.

(Extracted from an Inaugural Essay presented to the Philadelphia College of Pharmacy.)

[The first part of this Essay, having reference to the botanical and chemical characters of the plant, is omitted, as nothing new was elicited beyond the results of J. J. Martin, published in vol. vii. of this Journal. Mr. Perot isolated a deliquescent substance by the process for cathartin, and by repeated distillation obtained a small portion of volatile oil from the leaves. The latter part of the Essay, in reference to the therapeutical value of this plant, is published entire, because it appears to be at variance with the received opinions of American medical writers. We hope the subject will attract

the attention of physicians who have used the American senna, and induce them to give their experience in regard to its activity as a cathartic, compared with the imported drug.—EDITOR AM. JOUR. PHARM.]

In order to test the medicinal properties of the American senna, I thought best to do so by making a fluid extract, and comparing its virtues with those of a preparation from the imported article. Two different collections of the plant were made, one in the month of August and the other in September. The first was in full bloom, and the other had ripened and bore its fruit in fine clusters, which was a pendulous legume, several inches in length, and of a dark color. From these two collections two preparations were made according to the official formula, as follows:

R. American senna, August collection,	8½ oz.
Alcohol,	Oj.
Water,	Oiss.

The leaves were macerated in the diluted alcohol for twenty-four hours, and then displaced until Oij. of liquid were obtained; these were evaporated to f.3v., filtered, and 3vss. of sugar added, which was dissolved by the aid of a gentle heat. To the fluid extract thus obtained, I then added f.3ss. of Hoffman's Anodyne with f.3¼ of oil of fennel dissolved in it. A similar preparation was made from the September gathering, and one also from some leaves obtained from the Shaker settlement.

Through the kindness of Dr. Martin, of the Philadelphia Dispensary, I am enabled to state the relative virtues of these different collections, as follows: The first case in which this extract was tried was that of a married man suffering with an acute attack of pleurisy; his bowels were moved with calomel and rhubarb on the first day of the treatment, and followed with ten grains of Dover's powder at bed time. The next morning one tablespoonful of the fluid extract made from the August gathering was administered, and in six hours another, without producing an evacuation, and it required a full dose of a purgative medicine to produce the desired effect.

The second case was that of a married woman who was suffering from catarrh; for her, one fluid ounce of the extract from the September collection was prescribed, with directions for taking the same, but she returned the next day without having had an evacuation.

Casethird was also a married woman with an attack of neuralgia. Two fluid ounces were administered here without effect.

Case fourth was a married woman with inflammation of the mammae. One and a half fluid ounces of the extract prepared from the Shaker senna was given, and no effect produced.

Case fifth was one in which one and a half fluid ounces were given of the above to a man, but without any action.

There were several other cases in which this preparation was administered, but all resulted as above; thus proving most conclusively that the *Cassia Marilandica* is very weak, if possessing any purgative properties at all, and entirely inferior to the imported senna; having signally failed in all cases in which it was tried. There was one other case in which it was given in combination with epsom salts, but the effect produced was no more than that from the last named purgative.

The above experiments, carefully performed by Dr. Martin from preparations of the plant in its greatest state of perfection, prove, in my opinion, that its therapeutical qualities have been overrated, and that it does not possess the virtues which have been ascribed to it by the medical profession; and thus this previously unsettled question is finally determined, that the *Cassia Marilandica* possesses no cathartic properties that would entitle it to be used as a substitute for the other varieties of senna.

ON FLUID EXTRACT OF ERGOT.

By T. ROBERTS BAKER, of Richmond, Va.

In a former paper upon Ergot, published in the *American Journal of Pharmacy*, of April, 1852, the subject was treated purely in its chemical relations.

In that paper were given the entire results of my analysis of ergot, together with the processes resorted to for extracting the different constituents. Since the period referred to, I have prepared a fluid extract of ergot, availing myself of the processes employed in, and the numerical results of, my analysis, as the basis of operations.

When we consider the uncertainty attending the administration of powdered ergot, owing to the inferiority of the article before powdering, or its liability to deviate when kept powdered,

together with the objectionable size and character of the dose, the advantages of a preparation combining the valuable properties of ergot to the exclusion of the inert constituents, which only serve to increase the bulk of the dose, are apparent. The use of the formula given below, will secure such a preparation :

R. Ergot, freshly powdered, 2 lbs. avd.

Ether,

Alcohol 80 per cent.

Water,

Simple syrup, *aa.* q. s.

1st. Displace the ergot with ether until the menstruum comes through nearly colorless, and evaporate spontaneously to procure the oil.

2d. Next displace with the alcohol to exhaustion, and evaporate by water-bath to a thin syrupy consistence.

3d. Next, displace to exhaustion with the water, and evaporate the resulting liquid as fast as it is obtained, in order to guard against chemical changes. Then strain to separate albumen; after which mix it with the alcoholic extract, and evaporate the whole to a syrupy consistence. The evaporated mixture of the aqueous and alcoholic extracts should then be incorporated with the oil first, and afterward with sufficient simple syrup to make up the measure of two pints. To each fluid drachm of this add one minim of oil of peppermint.

The dose of this preparation is a fluid drachm, which represents two scruples of powdered ergot.

Upon reference to the description of the analysis alluded to in the first part of this article, it may be seen that the arrangements for displacing in preparing the Fluid Extract of Ergot are in reverse order to those used in making the analysis. My reasons for this change in the arrangement are based upon the information developed by the analysis, and are as follows. As the ether is used for the extraction of the oil only, those constituents which required other solvents were calculated to retard and prevent by their presence the entire extraction of the oil in the isolated condition—for one of the resins of ergot is also soluble in ether—and coming away with the oil would, in a quantitative analysis, serve only to multiply processes; hence the necessity, in making a quantitative analysis, of employing the ether last,

or after every other available solvent has been used. But, in making a Fluid Extract of Ergot, the object will be to present the valuable constituents recombined, which, as will be shown, requires the treatment for analysis to be reversed. If the solutions obtained by the different menstrua employed have to be recombined, it follows that the solution first obtained must be reserved until that last obtained has exhausted the material under treatment; and as aqueous solutions of organic substances are very liable to chemical change when kept, the necessity of employing the water last is apparent. On the other hand, the necessity for using the ether first in displacing for a fluid extract is also apparent, as it brings away with the oil one of the resins insoluble in the different menstrua subsequently to be employed, and thus removes an impediment to the success of the processes which follow.

ON SOME PHARMACEUTIC PREPARATIONS.

BY JOHN T. PLUMMER, M. D.

Liquor Morphiæ Sulphatis, U. S.—I do not know that any of our authorities speak of this preparation as being any other than a permanent solution. According to my experience, however, it certainly ought to be classed with the extemporaneous remedies. That it was not likely to be a durable solution might, indeed, have been inferred from the nature of the constituents. But as it is desirable to have a lasting preparation of this salt in a fluid form, without objectionable additions, I devised the following formula some years ago, and have made my solutions of sulphate of morphia according to it ever since; and as the experience of several years has satisfied me of the durability of the preparation, as well as of the efficacy of it as a therapeutic agent, I feel no hesitancy in recommending it.

R. Morphiæ Sulphatis, grs. viii.
Aquæ destillatæ,
Syrupi ana f.ʒiv.
Spt. Etheris Comp. f.ʒi.

Dissolve the salt in the water, add the syrup, shake the mixture, and then add the Hoffman's Anodyne.

If this solution should prove to be too thin a syrup for warmer

latitudes, it would be corrected by increasing the proportion of officinal syrup. I have made the preparation of different degrees of consistence : in the foregoing formula the proportion of syrup is reduced, perhaps, to its lowest practicable point to retain the character of a syrup. If it is desirable, sometimes, to have a solution free from saccharine matter, it is probable that a more permanent preparation could be obtained than the present officinal one, simply by the addition of Hoffman's Anodyne to it. But in this case there would be an obvious precipitation of the ethereal oil of Hoffman's Liqueur, which appears scarcely to disturb the transparency of the *Syrup*, and there would be also the increased facility of evaporation of the protective fluid. Experience, however, will best determine the feasibility of this aqueous preparation.

I have labelled this preparation, for my own convenience in prescribing, *Syrupus Morphice Sulphatis Compositus*. The compound spirit of sulphuric ether is added in order to preserve the thin syrup from decomposition ; in much larger quantities it would have the advantage of co-operating with the salt of morphia as an anodyne, but as in each fluid drachm of the syrup there is but one thirty-third part of it Hoffman's liquor, it can exert but little power as a co-adjuvant of the morphia.

Galbanum.—It is stated in our excellent U. S. Dispensatory, that this gum resin "in the United States is never prescribed internally." And under the head of *Tincture of Galbanum* a similar observation is made concerning this preparation. And I believe the tincture is not recognized, either in the U. S., the London, or the Edinburgh Pharmacopœia.

From my own observation, I judge that the above quotation from our Dispensatory is substantially correct, having never known the medicine to be prescribed by others, except in a few instances at my own instigation. I may say, however, that I have prepared and used the *Tinctura Galbani*, made according to the Dublin Pharmacopœia, from an early period of my medical practice, and I should now, after a length of twenty-seven years in the profession, be at a loss to find a substitute for it.

It is by no means a potent remedy, as we find the article in this country, but it properly belongs to that class of milder therapeutic agents which we cannot well dispense with, while they

procure relief from those numerous morbid annoyances which, though not fatal in their tendency, we are not generally willing to submit to without an effort to alleviate, if not to cure.

Syrupus Capsici.—I have for some years past prepared a syrup of capsicum by the same method employed in the manufacture of syrup of ginger. The process makes a beautiful preparation, serviceable in many affections of the throat, in which a local stimulus of the kind is desirable. If the addition of a little acetic acid to this syrup should be thought proper in any case, it can be made without detriment to the transparency or pungency of the preparation.

Magnesia Sulphas.—In 1847, in a Report on the Progress of Materia Medica and Pharmacy, given in the Half-Yearly Abstract of the Medical Sciences, it is said that sulphate of magnesia has "been carefully studied by Ladomir Combes, especially in relation to the best mode of concealing its bitter taste. After a number of trials, he at last succeeded in affecting this by the simultaneous administration of tannin or coffee; the former, however, is the active agent. The peculiar astringent taste of the tannin may be removed by the addition of an agreeable aromatic. In roasted coffee we have both these advantages combined." And it is added: "this fluid [the decoction of coffee and salts] does not impart the slightest taste of the bitterness of the salts."

These statements were republished in other works; but beyond this, I have seen no testimony on the subject, either affirmative or negative.

To satisfy myself in relation to it, I boiled together, on the 9th of 4th mo. 1854, in a Florence flask, for two or three minutes,

Sulphate of Magnesia	ʒss.
Ground Roasted Coffee	ʒiiss.

The coffee had been well roasted, and was of fine flavor. After the decoction was partially cooled, it was filtered into a glass bottle of such size as to leave two-thirds of it empty. After corking the vessel, it was set aside in a shady part of my office, undisturbed for forty three days. At the expiration of this time, I discovered upon the surface of the fluid, that two centres of mold had formed.

The taste of the decoction, at the time that it was prepared, proved to be quite palatable, at least to a coffee-drinker; the bitterness of the salts was barely perceptible; and then not until after the liquid was swallowed. Although the taste was almost unobjectionable, the odor of the fresh decoction too much resembled that of beef's gall to be agreeable. But now, at the end of the period named, that odor was supplanted by the more pleasant aroma of cold coffee; and there was little or no abatement in the agreeable taste of the preparation.

Without disturbing the two spots of mold, the bottle was again corked, replaced in the same situation, and left for forty-eight days longer. The decoction had now been made ninety-one days, and had been exposed to a temperature of from 40° to 70° Fah. The two moldy centres had by this time enlarged and coalesced, so as to occupy about one fifth the whole surface of the liquid in the bottle. There was, also, a curdy deposit at the bottom of the vessel resembling coagulated albumen. The decoction itself was dark as usual, and perfectly clear. The odor of coffee was nearly gone. The flavor of cold coffee was yet apparent enough almost entirely to conceal the bitterness of the sulphate.

The whole liquid was now passed through Swedish filtering paper, the bottle well washed, and the filtrate replaced in it. After twelve days repose in the same situation, a spot of mold was again formed on the liquid; the lower end of the cork was covered with it, and the air in the bottle had a musty odor, mingled with that of coffee. There was also a fresh deposit resembling very fine "coffee grounds." The mold continued to spread for eight or ten days more, when I discontinued the experiment.

It does not appear from my use of this preparation in medical practice that the salts lose any of their cathartic power by the presence of the decoction of coffee.

Richmond, Indiana, 5th mo. [May,] 1855.

CHEMICAL NOMENCLATURE.

By J. CHESTON MORRIS, M.D.

In the March number of this Journal I drew attention to some infringements on the laws of nomenclature; in the May number is an answer by Dr. Bache, to my article, which seems to me to call for a more distinct statement, on my part, of the mooted point. The whole question lies in a nutshell, and resolves itself into an inquiry as to what is generally received among chemists as the law. As to the preferableness of one plan or the other for teaching students, we ought never to sacrifice truth to expediency,—so that even if the “equivalent composition principle,” were easier to remember (which I beg leave to doubt) yet less correct, according to established chemical usage, we would not be justified in adopting it—such a course would lead inevitably to the confusion I have already pointed out.

Fownes says, in the last American edition of his chemistry, p. 200 :—“When a powerful oxygen acid and a powerful metallic base are united in such proportions that they exactly destroy each other’s properties, the resulting salt is said to be neutral : it is incapable of affecting vegetable colors. Now, in all these well characterised neutral salts, a constant and very remarkable relation is observed to exist between the quantity of *oxygen* in the base, and the quantity of *acid* in the salt. This relation is expressed in the following manner : To form a neutral combination, as many equivalents of acid must be present in the salt as there are of oxygen in the base itself. *In fact this has become the very definition of neutrality, as the action on vegetable colors is sometimes an unsafe guide.*” The italics are mine. This is the only authority quoted by Dr. Bache; hence, I think it sufficient to have shown how entirely he supports my view, only adding that the language of every standard chemical work I am familiar with is the same. As to the name bestowed on the law I am advocating, I think it would be better expressed as the “law of neutrality of composition,” to indicate that it refers not so much to the action on vegetable colors as to the proportion of the components of a salt.

I acknowledge a preference for the terms protosulphate, deutosulphate, &c., for ordinary use, to sulphate of the pro-

toxide, deutoxide, &c.; they are neater, shorter, and therefore easier remembered. And if the rule is universally adopted among chemists (as it seems likely to be) that such prefixes shall always denote the state of oxidation, we shall gain a clear and comprehensive mode of expression. But the law I have been defending must be acknowledged and observed first, or this latter one fails of expressing distinctly the composition of salts. Perspicuity, exactness and brevity are the three desiderata in a nomenclature; and I leave the reader to judge between the following expressions, supposing for the sake of argument that there were two systems, upon either of which we might base our expressions, instead of only one, as I have already shown.

Monosulphate of the protoxide of iron.	}	Protosulphate of iron.
Tersulphate of the sesquioxide of iron.		Sesquisulphate of iron.
Bisulphate of the deutoxide of mercury.		Deutosulphate of mercury.

It strikes me that any one having an ordinary acquaintance with chemistry would pronounce the latter superior in all three points to the former.

Philadelphia, May 31, 1855.

ON A METHOD OF PRESERVING ERGOT.

By DR. R. J. NUNN, of Savannah, Georgia.

The effectual preservation of ergot of rye has always been a matter of considerable moment. The following method, therefore, which I have adopted and successfully used for many years, may not be uninteresting to some of your readers.

The object to be attained in all such attempts, must be to insure the perfect exclusion of atmospheric air and moisture, and at the same time, preserve the material from the action of parasites, these requirements may be perfectly fulfilled by treating the substance in the following way:

Having obtained some ergot on the quality of which reliance can be placed, let it be reduced to a coarse powder, (for which purpose an ordinary coffee mill will amply suffice) and made as dry as convenient—it is preferable but not absolutely necessary

that the powder should be thoroughly dried at a temperature not exceeding 139° F. Next prepare a solution of camphor in ether. 80 grs. of camphor to 3j. ether will be found to be a convenient strength for small bottles; have ready some strong ounce bottles, cleaned and dried. As it is important the bottles should not be damp, it would be well either to dust them out without wetting, or if washing is preferred, let them be well dried in a drying closet before use; finally, provide for the vials some good tightly fitting velvet corks.

Into one of the bottles put a drachm of the solution of camphor above mentioned, and immediately begin filling with the dry powdered ergot; with a suitable instrument press the powder very tightly several times while filling, and continue the operation until the bottle is quite full of the closely compressed powdered spermædia.

On examining the appearance of the contents of the bottle, the lower half will be observed to have a dark, damp look, while the upper part will still preserve the light brown color of the dry powder; the line of demarcation will, however, be observed to be slowly ascending, when the whole of the ergot in the vial has a moist appearance, which is a criterion that all the atmospheric air has been expelled and its place occupied by camphorated ethereal vapor; about half a drachm of the solution of camphor should be poured in, and the bottle immediately corked very tightly. The tops may now be covered with sealing wax.

If larger or smaller bottles are used, the proportion of the preserving solution should, of course, be relatively increased or diminished. Should the ergot be preserved in large bottles, and if it be subsequently desired to distribute it among a number of smaller ones, the above process must be gone through precisely as if the ergot were being put up for the first time.

The bottles should be examined occasionally; and as long as the ergot appears damp, the efficacy of the drug may be relied on. As soon, however, as any part of the powder presents the slightest indication of dryness, the bottle should be opened, about a drachm of the solution of camphor added, and then quickly restopped with new corks.

The use of sealing-wax as a coating for the corks may appear rather inappropriate on a bottle partially filled with ethereal

vapor, but it serves the very useful purpose of being an excellent check on the proper preservation of the contents; for if the bottle be examined occasionally, during a few days after it is laid aside, and the wax be found to retain its hardness, it may be reasonably concluded that the vial is effectually closed; but if the wax be at all softened, it indicates some inaccuracy in the stopping; the cork should in this case be immediately withdrawn, about half a drachm of the preserving solution poured in, the vial re-stopped with a new cork, and finally the wax re-applied.

Too much stress may seem to be laid on the apparently trivial circumstance of the use of good velvet corks; but it must be remembered, the success of the process depends almost entirely on them, for it will be found by practice to be almost impossible to insure the perfect closure of the mouth of the bottle with any but this kind of stopper, as the vapor of the ether readily passes through the pores in the inferior varieties of corks.

The heat of the water used to make the infusion of ergot, is amply sufficient to vaporize and expel every particle of the camphor and ether required for its preservation.

It may be appropriate to mention, that I have administered ergot which had been preserved in this way for over eight years, and could not appreciate the least deterioration in its efficacy.

The above principle might, I think, be advantageously applied to the preservation of other substances, and anhydrous alcohol or some other suitable liquid substituted when ether would be inadmissible.

Savannah, June 4th, 1855.

AMERICAN EXTRACT OF LIQUORICE.

BY THE EDITOR.

It may not be known to many of our readers that of late years a considerable amount of extract of liquorice has been prepared in this country from the dried root of *Glycyrrhiza glabra* imported from the Mediterranean. This manufacture is chiefly conducted at the laboratory of the Messrs. Tilden, at New Lebanon, Columbia county, New York, well known for their extensive opera-

tions in the cultivation of medicinal plants and the preparation of extracts. They find it necessary to employ a good quality of root to get the extract in its most desirable form, much of it being so badly cured as to be unfitted for this use. The drug is coarsely ground, subjected to the action of condensing steam in a large extracting vessel, and the concentrated infusion thus obtained transferred to vacuum pans and rapidly reduced to extract without access of air, and consequently without the formation of that large proportion of altered extractive matter that is found in even the best Calabria extract. Owing to the same cause the color is much lighter. They are now making about 100 pounds of this liquorice ball per day, and expect the current year to consume about 200,000 lbs. of the dried root. The extract is thrown into the market in three forms: in boxes of 25 lbs. weight, into which the extract is run in mass whilst in a soft state; in small rolls, of eighty to a pound, intended for medicinal use; and in the form of *lozenges*, put up in boxes like the Pontefract liquorice of England. The last two forms of the extract contain a portion of gum arabic, to give it firmness, so that it will not lose its shape. This has been found absolutely necessary as a substitute for the large quantity of insoluble apotheme in the European extract, which acts as a skeleton or framework to retain the form of the rolls. No other kind of gummy matter is used for this purpose, and its introduction in no wise interferes with the employment of the extract for medicinal purposes.

We have examined the extract in mass; its color is at first light brown, becoming on the exterior, by age, much darker, especially if it has become damp. Although firm in cool weather, it settles down in the warm season, and cannot be prepared in the form of rolls for reasons before noticed. The specimen in our possession, which is several years old, has the following characters: It is almost entirely soluble in cold water, is precipitated by dilute sulphuric acid, has a slight odor, analogous to that of Calabria liquorice when moistened, and a sweet peculiar taste, more like that of liquorice root than the imported extract. For medicinal use, this variety of "liquorice" possesses advantages which should lead to its employment; among

these, its greater purity and more complete solubility and agreeable taste are foremost.

Several years ago we believe an experiment was made in the culture of the *Glycyrrhiza glabra* in New Jersey. We are not informed in reference to the causes of its being abandoned, but we do know that the plant will flourish in the vicinity of Bordentown, and even become a nuisance in a garden, by the roots extending themselves over the beds, and interfering with other plants.

A large portion of the liquorice ball imported into this country is used in the manufacture of chewing tobacco at the South, and for this purpose the pure extract of the Messrs. Tilden has been much liked. Whilst our Commissioner of Patents is engaged in so many praiseworthy efforts to introduce foreign useful plants, cereal grains, fruits, &c., which of late years have rendered the operations of that branch of the public service at Washington so acceptable, it would be well that medicinal plants should not be overlooked, and the possibility of the liquorice culture being extensively carried on in Virginia and the other Southern States is certainly worthy of a share of attention.

GLEANINGS—PHARMACEUTICAL AND MEDICAL.

Syrup, Essential oil and distilled water of Strawberries.—M. Stanislaus Martin, (*Jour. de Chimie Médicale*, Avril, 1855) recommends, that the berries be put in an earthen vessel with alternate layers of powdered sugar, placed in a cellar until the next day, and then thrown on a sieve for the syrupy juice to drain off. This juice is put in a bottle and heated by Appert's method.* The strawberry syrup thus prepared is clear, of a beautiful color and agreeable odor and taste of the berry, and can be preserved a year without change. [Each pound of picked strawberries, requires a pound and three-quarters of sugar.—EDITOR.]

M. Martin obtains the essential oil by the following means: The fruit is crushed, strongly expressed to separate the juice,

* [Appert's method consists in placing bottles, loosely corked, containing a liquid to be preserved, in cold water, which is then heated till it boils, so as to coagulate the albumen, when present, in the liquid treated, and then, while yet hot, hermetically sealed.—EDITOR.]

which is put in a bottle with rectified ether. After two days contact, decant and mix the ethereal liquid with powdered sugar. This addition is repeated a number of times until the sugar has a sweet odor. The seeds should be removed from the juice before treatment by ether, else the disagreeable fixed oil they contain is extracted with the volatile oil.

Strawberries give a distilled water that does not become agreeable until five or six months old; it is advisable to put salt in the water of the alembic. Distilled water of strawberries may be employed to aromatise lozenges and syrups.

Diuretic Wine.—M. Granel suggests the following as a diuretic preparation, viz: squill sliced, and digitalis leaves bruised, each two drachms; best cinnamon three drachms; acetate of potassa half an ounce; Madeira wine a pint. Macerate during eight days and filter.

The dose is a table-spoonful in the morning.

The dose may be increased to four spoonfuls a day: two in the morning and two in the evening, at least three hours after the last meal.

Traumatacin.—Dr. Eulenberg, of Berlin, gives this name to a solution of *gutta serena* in chloroform. He employed it in a case of inveterate psoriasis, and in eczema. It is applied so as to form a shining pellicle over the part affected, which is renewed daily. In three or four weeks the skin had lost its scaly character. A similar application to an eczematous eruption in the arm pits, cured it in three weeks.—(*Jour. de Chim. Méd.*)

Poudre du Caucase—Powder of Caucasus. Under this name a powder is sold in European commerce for destroying insects, as lice, fleas, ants, and the worm which eats furniture, which is derived from the leaves and flowers of *Pyrethrum caucasicum*.

This powder is said to kill insects by its odor, which is inert to man. It is used by laying it in a bag near the infected place, or dusting it on, or it may be made into a tincture with six parts of alcohol, and this solution applied with a brush. The smoke resulting from the slow combustion of the powder is said to be a sure preventive of these vermin when applied, which is readily done by holding a hot iron, on which the powder is thrown, in the places likely to be infected with vermin. M.

Chevallier, suggests that the common pellitory roots might answer equally well.

Chocolate Iron Lozenges.—M. Quevenne, in a communication to the Academy of Medicine, on reduced iron, has given the following recipe for chocolate lozenges, viz :

Take of Iron by Hydrogen, (Pulvis Ferri U. S. P.) 500 grs.

Vanilla Chocolate, 7000 grs.

Simple Syrup, q. s. or, 2500 grs.

Divide the chocolate into 666 nuts; moisten slightly their surface with syrup, and roll them in the powdered iron previously mixed with a little powdered sugar, so as to divide the iron equally among all the nuts, and afterwards cover them with a layer of sugar. Each lozenge contains $\frac{1}{3}$ of a grain of iron.—(*Jour. de Chimie Méd.*)

Chocolate iron lozenges each containing one grain of iron, are prepared by Mr. S. Simes, of this city, in which the iron, sugar and chocolate are incorporated together, and cut into oval tablets like ordinary lozenges, which is a much more managable method than the above.

Ergot of Wheat.—Dr. Grandclément, in his inaugural essay, (noticed in *Jour. de Chim. Méd.*, for May 1855) has called attention to the ergot of wheat, which is employed instead of rye ergot at Clermont-Ferrand in France. In reference to its properties, viewed in a mass, it looks like ergot of rye, but examined singly the two are easily distinguished. Ergot of wheat is less elongated, more in the normal shape of the grain, and the longitudinal striæ are less equally deep, one being more so than the rest. Ergot of rye varies in length from ten to seventy millimetres; on the contrary ergot of wheat varies from four to fifteen millimetres. The color of wheat ergot is very similar to that of rye, but is sometimes browner. Their taste is the same. The odor of wheat ergot is less disagreeable than that of rye, and neither of them will germinate.

Examined by the microscope, M. Grandclément found; 1st, that the sporules of wheat ergot are larger than those of rye ergot. 2d. That the mass of the first is exclusively composed of sporules; whilst in that of the second there are parts without a trace of them, and none where the mass is entirely formed of them. 3d. That there is no substance in wheat ergot parallel

with the amylaceous matter of rye ergot, either in regard to form, or reaction with iodine.

Ergotine prepared from wheat ergot by Bonjean's process, is different in characters from the ordinary, but the most striking difference between the two is, that wheat ergot is not liable to spoil and lose its efficacy by keeping, as is the case with rye ergot, even when reduced to powder, and as its therapeutic effects are the same in all circumstances, M. Grandclément thinks its use promises to be productive of advantage to practitioners.

Action of picric (carbazotic) acid on the economy.—Dr. Spring (*Scalpel*, in *Jour. de Chem. Med.* Mai 1855,) communicated to the Board of Health, of Liege, as the result of his experiments, that picric acid is an *acrid poison*, which possesses an action analogous to that of *Anemone pulsatilla*, of creasote, of briony and of gratiola; that in the dose of $3\frac{1}{2}$ to $4\frac{1}{2}$ grains it rapidly killed a rabbit, and that evident traces of inflammation are found in the digestive apparatus after death. Dr. Spring thinks this agent may give rise to serious accidents.

Syrup of Guaiac.—M. Mouchon (*Bull. Gén. de Thérap.*), gives several formulæ for preparations of guaiac resin. The base of these is a tincture made with one part of guaiac to four parts of alcohol (56 per cent.) by displacement. To make the syrup of guaiac, half a pound of this tincture is mixed with a pound of syrup of gum arabic, and the alcohol distilled or evaporated off till the syrup weighs one pound.

Thus obtained, syrup of guaiac is very homogeneous, owing to the emulsionizing effect of the gum in suspending the resinous particles.

New Hæmostatic agent.—M. Monsel, military pharmacien, (*Gaz. Med. de Paris*, in *Jour. de Chim. M.*), suggests the following solution as an efficient means of checking hæmorrhage :

Take of Tannic acid,	a scruple.
Alum, (free from iron)	five drachms.
Rose water,	twenty-five ounces.

Dissolve. This solution also possesses a remarkable antiseptic power on the blood with which it comes in contact.

Double salt of Quinia and Iron.—M. Langeli (*Presse Méd. Belge.*) has prepared a salt which he believes is a double salt of protoxide of iron and quinia with sulphuric acid. It is made by

dissolving an ounce of protosulphate of iron in six ounces of water, and adding to the solution an ounce of sulphate of quinia and a few drops of sulphuric acid to dissolve it. This solution is filtered, evaporated till a pellicle forms, and on cooling affords prismatic crystals of the double salt, strongly bitter, styptic, and white, very soluble in water and alcohol, and possessing an acid reaction.

Dr. Regnoli has employed this new product in several cases of cholera with great success.

Soluble Citrate of Magnesia.—M. E. Robiquet (*Jour. de Chim. Méd.*) suggests the following formula and manipulation to produce a soluble citrate of magnesia :

Take of Citric acid, a kilogramme,	(35½ oz., avoird.)
Carbonate of magnesia, 630 grammes,	(21½ oz., “)
Boiling water, 350 grammes,	(10½ oz., “)

Reduce the citric acid to coarse powder and dissolve it in the boiling water. When the solution is cold, and before it crystallizes, pour it into a wide earthen vessel, and by means of a sieve distribute the carbonate of magnesia evenly and rapidly over its surface without stirring. The reaction takes place little by little ; when it ceases, beat the mixture rapidly as possible so long as it retains its pasty consistence. It is absolutely necessary to prevent the mixture from becoming heated, because if the temperature rises quickly it is a certain sign that the citrate of magnesia has changed its molecular condition and become *insoluble*. For this reason it is safer to set the earthen dish in a vessel of cold water, and to spread out the citrate on the sides of the dish. When this manipulation is finished, the whole is allowed to repose during 24 hours, divided into masses and dried at a heat not exceeding 70° Fahr. It will be found that the chief secrets of success, are the employment of the smallest possible quantity of water, and to avoid the rise of temperature at the moment of combination, which is the result of a change of state of aggregation of the salt, and not to the reaction between the carbonate and citric acid.

Amianthus as a substitute for charpie or lint.—Dr. Dumont, of Monteux, has found that that form of asbestos called Amianthus may be employed as a dressing instead of scraped lint. This substance is soft, permeable, smooth to the touch and its in-

combustibility admits of its being used over and over again as it is purified by burning out the contaminating matter. Amianthus can be obtained in abundance in various parts of Europe, Asia, and the United States, and its fitness for this purpose is worthy of consideration in hospital practice.—*Union Méd.*

Antimoniate of Quinia in Intermittents.—Dr. La Camera, of Naples, in treating a solution of sulphate of quinia by a solution of antimoniate of potassa, has obtained a white product crystallized in needles, bitter to the taste, and soluble in hot water and in alcohol and ether. This antimoniate of quinia has given excellent results in periodical diseases, both simple and complicated with rheumatism, in sub-continued fevers of Torti, and in pernicious fevers. The dose is 0.4 grm. to 0.6 grm. during the apyrexia, and it is rarely necessary to be administered a second time.

On the adulteration of Saffron by the flowers of the Fuminella. By M. J. Leon Soubeiran.—The high price at which saffron is sold is a cause which induces the designing to falsify it, and already a number of articles have been used, such as the petals of calendula and arnica, cut, colored and oiled to give them suppleness, and those of *Cartbamus tinctorius*, and not satisfied with these they have sought a new substance in the *Acafrao*, and more recently the flowers called *Fuminella*, from Brazil. In the early part of this year, M. Soubeiran noticed in the Paris drug market a saffron consisting of the stigmata of *Crocus sativus*, with a large proportion of *fuminella*. A very simple means of separating them is to take a large pinch of the adulterated saffron on a piece of paper, and give the latter a succession of taps beneath the saffron. The *fuminella* being smaller and heavier than the true saffron, falls to the bottom, on the paper, where it can be detected by its short fragments and its color, which has a rusty tint.

Their length varies from a fifth to two-fifths of an inch, according as they are broken or whole; are contorted after drying; appear ordinarily of equal width throughout their length, but, when whole, one extremity is more attenuated.

When these flowers are moistened, spread upon glass, and examined with a microscope, the characters of the corolla of *Synantheræ* are recognized.

The name of the plant yielding these flowers is not known, nor are they sufficiently perfect to enable the botanist to decide where to place them with certainty.

Oil of Erigeron.—Dr. Elwood Wilson, in the Transactions of the College of Physicians of Philadelphia, gives his experience with oil of *Erigeron Canadense* (not *Philadelphicum*) in five cases of uterine hemorrhage, in which it acted with marked efficiency. Dr. Benjamin H. Coates (in the same work) suggests an infusion of *Achillea millefolium*, (3ss. herb to Oj. boiling water infused 20 minutes) as an excellent agent in the same kind of hemorrhage.

Onions in Epistaxis.—Dr. Benjamin Rorer, of Germantown, recommends (Hay's Journal for April) a paste made by bruising the inner portion of the common onion with an equal weight of flour and sufficient vinegar to form a stiff paste. This is applied by pressing it in the nostril from which the hemorrhage issues, until filled, and securing it with a bandage. This was found to act after alum, nutgall, and tincture of chloride of iron had failed.

Cod-Liver Oil with Quinia.—Mr. William Bastick, at a recent meeting of the Medical Society of London, described the mode of preparing a solution of quinia in cod-liver oil, which he has brought to the notice of the medical profession. Mr. B. prepares the solution (Pharm. Jour., March, 1855,) by heating, in a water bath a mixture of powdered *anhydrous* quinia and cod-liver oil, in the proportion of two grains to the fluid ounce. The oil acquires a darker color as the quinia dissolves. The quantity may be varied to suit the prescriber. The quinia is obtained in the condition proper for solution in the oil by precipitating a solution of sulphate of quinia with ammonia, washing the precipitate, drying it, and finally fusing it in a porcelain capsule by a regulated heat.

ON ALUMINIUM AND ITS CHEMICAL COMBINATIONS.

By M. H. SAINTE-CLAIRE DEVILLE.

It is known that Wöhler obtained aluminium in a pulverulent state by treating the chloride with potassium. By carefully conducting Wöhler's process, the decomposition of the chloride of aluminium may be so managed as to produce sufficient incandescence to render visible the agglomeration of the metal into glo-

bules. If the mass composed of the metal and of chloride of sodium (it is preferable to use sodium) be heated to bright redness in a porcelain crucible, the excess of chloride of aluminium will be driven off, and there will remain a saline mass having an acid reaction, in the midst of which will be found globules, varying in size, of perfectly pure aluminium.

This metal is as white as silver, and malleable and ductile in the highest degree. But when worked it appears to become harder, and its tenacity probably approaches nearly to that of iron. It may be hardened and again softened by annealing. Its density is 2.55. It may be melted and run out in the air without being sensibly oxidized. It is a good conductor of heat.

Aluminium is completely unalterable in dry or moist air. It does not become tarnished, and remains bright by the side of freshly cut zinc and tin while the latter lose their brilliancy. It is not acted upon by sulphuretted hydrogen. Cold water has no action upon it, and boiling water does not tarnish it. Nitric acid either diluted or concentrated, and diluted sulphuric acid, when applied cold, are also without action upon it. Its true solvent is hydrochloric acid, which evolves hydrogen and forms sesquichloride of aluminium. When heated to redness in hydrochloric acid gas, dry and volatile sesquichloride of aluminium is produced.

It will be seen that a white metal, unalterable like silver, which does not blacken when exposed to the air, which is fusible, malleable, ductile and tenacious, and which presents the remarkable property of being lighter than glass, may be rendered very useful if it could be easily obtained. When it is considered that this metal exists in considerable quantity in nature, its ore being clay, we can but wish that it may become common. I have every reason to believe that it may be so, for chloride of aluminium is decomposed with remarkable facility, at an elevated temperature, by the common metals, and a reaction of this sort, which I am now conducting on a larger scale than a mere laboratory operation, will decide the question in a practical point of view.—*Pharm. Journal, from Jour. de Pharmacie.*

RESEARCHES ON THE CONSTITUTION OF QUININE.

BY ADOLPHUS STRECKER.

(Translated from the *Annalen d. Chem und Pharm.*, August, 1854.

By J. M. MAISCH.)

Concluded from page 246.

Iodide of ethyle-quinine. If iodide of ethyle is added to an alcoholic or ethereal solution of quinine, pale yellow needles are formed after a few hours. I have washed them with ether, and dissolved them in boiling water, from which, on cooling, they re-crystallize in thin needles, combined to semi-spherical masses. The crystals are colorless, of a silky lustre, very light and bitter, and without reaction on vegetable colors. They neither lose weight nor alter their form at 110° C.; at a higher temperature they melt without losing weight, but assuming a yellowish color, and solidify on cooling to a glassy mass; at a still higher heat they are decomposed. They are freely soluble in boiling, little in cool water, and also in alcohol, but not in ether. The iodine which they contain can be precipitated as iodide of silver by its nitrate.

For analysis I used crystals which had been dried at 100° C. The combustion was attempted with oxide of copper and oxygen, the first part of the tube containing a roll of sheet copper, the application of heat to it was interrupted as soon as the oxygen commenced to oxidize the reduced copper. Thus the iodine was not set free, but remained in combination with copper.

I. 0.3460 grms. crystals gave 0.6975 grms. carb. acid, 0.1930 gr. water.

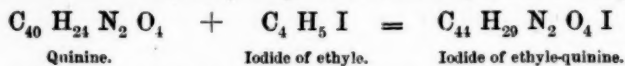
II. 0.2864 " " " 0.5760 " " " 0.1590 "

III. 0.4257 " " " 0.2080 " iodide of silver.

which lead to the formula $C_{44}H_{29}N_2O_4I$.

	Calculated.		Found.		
			I.	II.	III.
44 C	264	55.0	55.0	54.8	—
29 H	29	6.0	6.2	6.2	—
2 N	28	5.8	—	—	—
4 O	32	6.7	—	—	—
1 I	127	26.5	—	—	26.4
	480	100.0			

The formation of this body may be exhibited by the following.

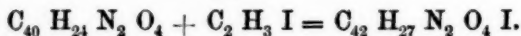


Iodide of methyle-quinine. An analogous combination may be had on adding iodide of methyle to an ethereal solution of quinine, when, after a while, crystals are deposited very similar to the former.

The crystals were dried at 110° C. before analysing them, when from 0.2412 grm. was obtained, 0.4792 grm. carbonic acid, 0.1285 grm. water, from 0.3624 grm. 0.1805 iodide of silver, which results agree with the formula $\text{C}_{42}\text{H}_{27}\text{N}_2\text{O}_4\text{I}$.

	Calculated.		Found.
42 C	252	54.1	54.2
27 H	27	5.8	5.9
2 N	28	—	—
4 O	32	—	—
1 I	127	27.3	26.9

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A watery solution of iodide of methyle-quinine or ethyle-quinine is not precipitated by ammonia, like other salts of quinine; an addition of potassa at first leaves it clear, but after a large quantity has been added, a turbidness occurs, and a precipitate is formed which dissolves in water more readily when heated, and, on cooling, deposits crystals resembling the original iodides; which, indeed, have not been decomposed by potassa, but only precipitated, as they are insoluble in that liquid. The separation of iodine takes place without difficulty by oxide of silver, which, added to a solution of iodide of ethyle-quinine in water, forms yellow iodide of silver, and leaves the solution strongly alkaline. If oxide of silver is added until the formation of iodide of silver ceases, and the filtered solution is evaporated in vacuo above sulphuric acid, the residue is uncrystallizable and becomes hard and pulverable very slowly. It is easily soluble in water and alcohol; in the latter solution ether occasions a turbidness and separates a syrupy stratum which slowly deposits colorless needles. The aqueous solution of this base has a caustic and bitter taste, readily absorbs carbonic acid from the atmosphere,

and leaves, on being evaporated in contact with the air, a crystallized carbonate which has an alkaline reaction even after becoming saturated with carbonic acid.

This base, which I call *ethyle-quinine*, could not be obtained fit for analysis; in its amorphous state it dries with too much difficulty, and when I tried to dry it at 120° C., it generated the smell of chinolin and had other properties not existing before, being insoluble in water, and on analysis yielding products different from quinine and the supposed composition of ethyle-quinine. I found in this residue dried at 120° 72.6 per cent. carbon and 7.8 per cent. hydrogen, and must, therefore, reserve its analysis for a future time.

On acids being added to the aqueous solution of ethyle-quinine and then evaporated, it yields salts, most of which are crystallizable. Some of them I have prepared and analysed.

The aqueous solution mixed with sulphuric acid until the latter predominates, leaves, on evaporation in the water bath, a syrup on which absolute alcohol is to be poured to crystallize it. These crystals are little soluble in alcohol, and by washing them with it, may be freed from any adhering acid; they easily dissolve in water, but do not recrystallize after evaporation; their solution reacts acidulous, is not changed by ammonia, but when concentrated, precipitated by potassa, which precipitate is soluble in pure water. When dried over sulphuric acid, the crystals lose at 120° C., 8.2 per cent. water.

0.5995 grm. of these crystals, after desiccation at 120° , produced, with chloride of barium and hydrochloric acid, 0.3185 sulphate of barytes, equal to 18.2 per cent. sulphuric acid, which is in accordance with the formula $C_{41}H_{29}N_2O_6, SO_3 + HO SO_3 + 4HO$, demanding 17.8 per cent. sulphuric acid in the dry salt, and 7.4 per cent. water of crystallization.

Another sulphate is obtained when sulphate of silver is added to the watery solution of iodide of ethyle-quinine, until all the iodine is precipitated as iodide of silver. After filtration and due evaporation crystals are formed, which are much less soluble in water than the former, but readily so in alcohol. After being washed with water the crystals were used for analysis.

1.520 grm. air-dry crystals at 110° C. lost 0.224 grm. water, or 14.8 per cent.

0.6213 grm. of this anhydrous salt decomposed to 0.1830 grm. sulphate of barytes, corresponding with 10.1 per cent. sulphuric acid.

Its formula is therefore $C_{44}H_{29}N_2O_5, SO_3+8HO$, which contains 10.0 per cent. sulphuric acid in the dry salt, and 15.2 per cent. water of crystallization.

Chloride of ethyle-quinine.—When hydrochloric acid is added to the solution of ethyle-quinine in water, and this evaporated in the air, a syrup results, in which, after a long time, thin needles are formed. But when a concentrated solution of chloride of sodium is added to ethyle-quinine, very soon needles are separated very much resembling those of the corresponding iodide. The best way to obtain them is to concentrate a solution of the nitrate (which does not crystallize, and is made by precipitating the iodide with nitrate of silver and filtering) and mix it with a concentrated solution of chloride of sodium. The needles are fine, combined to semi-spheroidal masses, which are to be recrystallized from boiling water; they are less soluble in cold water, neutral, and of the behaviour of the iodide. After being dried at $120^\circ C.$, from 0.4830 grm. was obtained 0.1785 grm. chloride of silver, or 9.1 per cent. chlorine, which corresponds with $C_{44}H_{29}N_2O_4Cl$, containing 9.1 per cent. chlorine.

The solution of ethyle-quinine mixed with hydrochloric acid, gives with chloride of platinum a yellow precipitate, soluble in boiling water, from which it crystallizes indistinctly.

0.3380 grm. of this double salt, when dried at 110° , yielded 0.0860 grm. platinum, or 25.4 per cent.

The formula $C_{44}H_{29}N_2O_4Cl+HCl+2PtCl_2$ demands 25.8 per cent.

The properties of ethyle-quinine and its combinations, show it to belong to that class of bases which are usually termed *ammonium bases*, sufficiently characterized by their strong alkaline properties, and the chlorides and iodides of which are not decomposable by potassa. The four equivalents of hydrogen of the ammonium are in these bases replaced by four organic radicals. Moreover, I have satisfied myself that ethyle-quinine does not contain another equivalent of hydrogen which might be replaced by ethyle; for a concentrated alcoholic solution of it does not

enter in combination on addition of iodide of ethyle, not even after some time.

If, accordingly, we may believe it to be demonstrated that ethyle-quinine is an ammonium base, the conclusion is irrefutable that quinine belongs to the *nitril bases*, or, in other words, quinine is a compound similar to ammonia, in which three organic radicals have taken the place of hydrogen. From this it follows further, that the formula $C_{40}H_{24}N_2O_4$ represents the equivalent of quinine, inasmuch as it resembles one equivalent of ammonia. By the addition of one equivalent of iodide of ethyle the triethyleamin Ae_3N changes to iodide of tetraethyleamin Ae_4NI , corresponding with the change of quinine to iodide of ethyle-quinine. Those bases that combine with one equivalent of iodide of ethyle must be equivalent, and, therefore, quinine as expressed by the formula $C_{40}H_{24}N_2O_4$ is equivalent with Ae_3N , and again this triethyleamin is equivalent with H_3N . If the equivalent of quinine was $C_{20}H_{12}NO_2$, the iodide of ethyle quinine ought to be $C_{24}H_{17}NO_2I$, which is contradicted by the analysis leading to the formula $C_{44}H_{29}N_2O_4I$.

Like quinine, ethyle-quinine combines with acids in two proportions, and these salts we can now designate as neutral and acidulous. The base of ethyle-quinine has probably in its free state the formula $C_{44}H_{29}N_2O_5$, HO , and ought to be called the hydrated oxide of ethyle-quinine, for which, however, we prefer the abbreviation of ethyle-quinine.

In the same way we call the salts—

Neutral sulphate of ethyl-quinine	$C_{44}H_{29}N_2O_5, SO_3$
Bisulphate of ethyle-quinine	$C_{44}H_{29}N_2O_5, HO, 2SO_3$
Chloride of “	$C_{44}H_{29}N_2O_4, Cl$
Iodide of “	$C_{44}H_{29}N_2O_4, I$
Chloride of “ and platinum	$C_{44}H_{29}N_2O_4, Cl+HCl+2PtCl_2$

We learn from the above that indeed organic bases may combine to form acid salts with hydrochloric acid, and such again with two equivalents of chloride of platinum. Most chemists, by believing the proportions of organic combinations to be identical with those of organic bodies, would not recognize other combinations of chloride of platinum, except with equal equiva-

lents, and I believe, in this case, I have proved first that other double salts of platinum exist.

The problem remains now to be solved, which are the three organic radicals contained in quinine. Although former experiments have thrown some light on this question, I decline now to enter into its discussion before further experiments have given us a stronger hold.

ON CIRCUMSTANCES MODIFYING THE ACTION OF CHEMICAL AFFINITY.

By J. H. GLADSTONE, Ph. D., F. R. S.

The question intended to be solved in this communication is,—what takes place when two binary compounds AB and CD are brought together under such circumstances that both they themselves and the products of their mutual action, remain free to react? Do they, according to a generally received opinion, remain unaltered, or, should the affinities so preponderate, become simply AB and CB? Or do A and C, according to Berthollet's view, divide themselves in certain proportions between B and D, the said proportions being determined not solely by the difference of energy in the affinities, but also by the difference of the quantities of the bodies? And, supposing the latter to be the correct view, do the amounts of AD and CB produced by the reaction, increase progressively with the relative increase of AB, or do sudden transitions occur, such as Bunsen and Debus have recently observed in certain cases where the products were removed at once from the field of action?

A reply was sought in the colors produced upon mixing different salts in aqueous solution. There were not many colored salts suitable for the purpose, as it generally happens that a base gives the same color with whatever acid it is combined, and *vice versa*; but the compounds of sesquioxide of iron were peculiarly adapted to the requirements of the experiment, as some are intensely colored, while others are nearly colorless.

The circumstances that attended the formation of the blood-red sulphocyanide were first fully examined. On mixing known quantities of different ferric salts with known quantities of different sulphocyanides, it was found that the whole of the iron

was never converted into the red salt; that the amount of it so converted depended on the nature both of the acid combined with the ferric oxide, and of the base combined with the sulphocyanogen; and that it mattered not how the bases and acids had been combined previous to their mixture, so long as the same quantities were brought together into solution. The effect of mass was fully tried by mixing equivalent proportions of ferric salts and sulphocyanides, and then adding known amounts of either one or the other compound. It was found that in either case the amount of red salt was increased; and that when the numbers of equivalents of the salt added were taken as abscissæ, and the amounts of red sulphocyanide produced, as ordinates, the numbers observed in the experiments gave regular curves, though not belonging to the second order. The curves representing the experiments in which sulphocyanide of potassium was mixed with ferric nitrate, chloride, or sulphate, appeared to be the same, but hydrosulphocyanic acid gave a different curve. The deepest color was given when nitrate of iron was mixed with the sulphocyanide, but even upon the admixture of one equivalent of the former with three of the latter, only 0.194 equiv. of the intensely red ferric salt was formed, and when 375 equivalents of sulphocyanide of potassium had been added, there was still a recognizable amount of nitrate of iron undecomposed. It was found that the addition of a colorless salt not only reduced the color of a solution of ferric sulphocyanide, but also that the reduction increased in a regularly progressive ratio according to the mass of the salt.

Other ferric salts were likewise examined. The black gallate gave results precisely analogous to those obtained by means of the sulphocyanide; the red meconate also confirmed Berthollet's views, but the action of mass was rendered obscure by the formation of double or of acid salts; the red pyromeconate resembled the meconate; the red acetate bore similar testimony; the blue solution of the ferric ferrocyanide in oxalic acid gave results fully corroborative of the influence both of the nature and of the mass of every substance present at the same time in the mixture; the purple and the red comenamate afforded similar results; while the red bromide (not the oxybromide,) though somewhat indistinct in its testimony, corroborated to a certain extent the preceding observations.

Experiments were performed with a view to determine what effect the mass of water might have on the salts operated upon; its influence in reducing the color of the ferric sulphocyanide was found to be very great, but the nature of it could not be exactly determined. As, however, it was uniform in its action in whatever manner the sulphocyanide had been produced, it could not affect the results of the preceding experiments. Water did not appear to act in any similar manner upon the other ferric salts.

From the mass of quantitative observations made during the investigation, it was possible to deduce not only the order of affinity of the various acids for sesquioxide of iron as compared with potash, but also to assign approximate numbers. Doubt may rest on the position of some terms in the series, but hydro-sulphocyanic acid certainly had the least affinity for ferric oxide in comparison with potash: it was represented by unity: the other acids followed in the order—nitric, 4; hydrochloric, 5; sulphuric, 7; gallic, 10; pyromeconic; meconic; acetic, 20; hydrobromic; comenamic; citric, 100; hydroferrocyanic 170.

Other colored salts were submitted to a more cursory investigation. The scarlet bromide of gold when treated with an alkaline chloride gave a striking instance of the effect of mass in gradually overcoming a strong affinity. The intensely red iodide of platinum afforded results which, though somewhat obscure, were not opposed in their testimony. So did the blue sulphate of copper when treated with different chlorides. The "manganoso-manganic oxide" dissolves in sulphuric or phosphoric acid of a red, and in other acids of a deep brown color; and it was found that hydrochloric acid was capable of changing the color of the sulphate according to its mass, while on the other hand, sulphuric or phosphoric acid altered in like manner the tint of the chloride. Somewhat similar results were obtained by means of the green chloride and the purple fluoride of molybdenum; and the blue solution that forms when gallic acid is brought in contact with both the oxides of iron at once, bore testimony to the same general laws. The peculiar optical character of certain salts of quinine was also taken advantage of for determining what changes took place among the compounds in solution. The amount of fluorescence exhibited by a solution of acid sulphate of quinine

was found to be affected by the admixture of a chloride, bromide, or iodide according to the nature and the mass of the salt added, and the addition of sulphuric, phosphoric, nitric and other acids was found to produce a fluorescence in solutions either of hydrochlorate of quinine, or of sulphate which had been rendered non-fluorescent by hydrochloric acid. Similar results were obtained with quinidine; and somewhat analogous ones with the organic bases contained in horse-chestnut bark, and in tincture of stramonium. An experiment is also narrated showing that the same laws hold good in respect to compound ethers as to salts having metallic bases, alcohol being employed as the solvent.

Besides the very diversified substances already mentioned in this abstract, several others, such as lead, mercury, zinc, potash, soda, baryta, lime and ammonia, are shown by a more indirect proof to enter into compounds which obey the same laws. Hence it is concluded that what was observed in reference to the ferric salts holds good very generally, if not universally.

The bearing of certain other phenomena upon the question at issue was also examined. The fact that precipitation, when it occurs, gives rise to a perfect interchange of bases and acids, is equally consistent with either Bergmann's or Berthollet's theory; but not so is the fact that two soluble salts cannot be mixed without the occurrence of precipitation, if one of the products that may be formed is an insoluble salt. The only recorded exception to this law, which occurs with oxalate of iron in the presence of a salt of yttria, under peculiar circumstances, was found on close examination to be in perfect accordance with the principles laid down by Berthollet. Besides the argument founded on this universal fact, several experiments were devised for the purpose of proving that the complete precipitation of an insoluble salt on the mixing of two soluble salts, was due to the insoluble compound being removed at once out of the field of action on the first distribution of the elements, thus necessitating a redivision, and so on until no more of it could possibly be formed. The phenomena attending volatilization have the same bearing as those connected with precipitation. If by the mutual action of two salts a substance be formed, which, though soluble in water, requires more water for its solution than is present, it crystallizes out; certain experiments were noted where this action occurs,

and it was found that they gave testimony in favor of the same views as have been supported by the preceding observations. The bearing of the phenomenon of diffusion of salts upon the point at issue was also examined; Malaguti's experiments were discussed; and they, as well as some observations on the solution of certain bodies by others set at liberty, were found to bear testimony also in the same direction.

During the whole of the experiments on this subject, most of which were performed quantitatively, no unequivocal instance occurred of two substances having so strong an affinity for one another, that they combined to the exclusion of other bodies of like kind present in the same solution. After showing that some reputed exceptions are not capable of being proved to be so, and after suggesting some probable limitations of the action of the general law, the paper concludes with the following deductions:—

I. That where two or more binary compounds are mixed under such circumstances that all the resulting compounds are free to act and react, each electro-positive element enters into combination with each electro-negative element in certain constant proportions.

II. That these proportions are independent of the manner in which the different elements were primarily arranged.

III. That these proportions are not merely the resultant of the various strengths of affinity of the several substances for each other, but are dependent also on the mass of each of the substances present in the mixture.

IV. That an alteration in the mass of any one of the binary compounds present alters the amount of every one of the other binary compounds, and that in a regular progressive ratio; sudden transitions only occurring where a substance is present which is capable of combining with another in more than one proportion.

V. That this equilibrium of affinities arranges itself in most cases in an inappreciably short space of time, but that in certain instances the elements do not attain their final state of combination for hours.

VI. That totally different phenomena present themselves where precipitation, volatilization, and perhaps other actions

occur, simply because one of the substances is thus removed from the field of action, and the equilibrium that was first established is thus destroyed.

VII. That consequently there is a fundamental error in all attempts to determine the relative strength of affinity by precipitation,—in all methods of quantitative analysis founded on the color of a solution in which colorless salts are also present,—and in all conclusions as to what substances exist in a solution, drawn from such empirical rules as, that “the strongest acid combines with the strongest base.”—*Chem. Gazette*, April 16, from *Proc. Royal Society*.

ON MANGOSTINE.

By Dr. W. SCHMID.

The mangostine tree (*Garcinia mangostana*), which is cultivated on the East Indian Islands, furnishes a fruit which is said to possess the most agreeable flavor of all tropical fruits. It is of the form of a berry and the size of an orange. Dr. Waitz, a surgeon in the Dutch East Indies, has employed the husk of the mango in fevers, and states that it is not only equal to bark, but even excels this when used in the fresh state. The author has accordingly examined these husks.

The husks used were dry, of a brownish-red color, thick and spongy, with an astringent taste, and contained internally a yellow, semicrystalline substance. They were finely powdered, and repeatedly extracted with water.

The watery solution contained for the most part a tannin, which produced a black color with iron. The residue was treated with hot alcohol, which completely dissolved the yellow crystalline matter. The fluid was filtered and left standing when a yellow amorphous mass separated on evaporation; this contained the body to which the author gives the name of *mangostine*, mixed with resin. The latter is very difficult of separation; the best method is to heat the filtered alcoholic solution to boiling, and add distilled water in small quantities until the fluid becomes opalescent. The resin, which is but sparingly soluble in cold dilute alcohol, is deposited on cooling; the mangostine does not separate until long afterwards, when it takes the form of small,

yellow, silky laminæ; so that by pouring the fluid from the deposit of resin, the mangostine may be obtained tolerably pure. To purify it further, it is dissolved in alcohol, and precipitated with basic acetate of lead. The precipitate is well washed, suspended in alcohol, and decomposed whilst hot by sulphuretted hydrogen. The filtered solution is then mixed with water whilst boiling until it becomes milky, as the mangostine only crystallizes from a dilute alcoholic solution. The complete purification of the substance is completed by repeated crystallization from alcohol.

Mangostine crystallizes in thin laminæ, of a fine golden lustre; it is tasteless and inodorous; melts at about 374° F. without loss of water, forming a thick, transparent, deep yellow fluid, which solidifies on cooling into a brittle, amorphous, transparent mass; it is heavier than water. When heated above its melting-point, it is for the most part decomposed, but a part sublimes unchanged. It burns on platinum foil without residue. It is soluble in water, but dissolves readily in alcohol and ether. The solutions have no reaction on litmus-paper.

Dilute acids dissolve the greater part of it with the aid of a moderate heat, and deposit it again unchanged on cooling. Concentrated nitric acid converts it into oxalic acid at an elevated temperature. Cold concentrated sulphuric acid dissolves it with partial decomposition, and with a dark yellowish-red color; when heated, carbonization commences. It dissolves in alkalies with a yellow or brownish color. It is not precipitated by metallic salts, with the exception of basic acetate of lead. It reduces the oxides of the noble metals. With chloride of iron it produces a greenish-black color, which disappears on the addition of acids. Analysis led to the formula $C^{40} H^{22} O^{10}$:—

	I.	II.	III.			
Carbon	69.64	69.63	69.74	40	3000	70.17
Hydrogen	6.66	6.37	6.44	22	275	6.43
Oxygen	23.70	24.00	23.82	10	1000	23.40

For the preparation of the compound of mangostine and oxide of lead, the substance was dissolved in alcohol, and then treated with an alcoholic solution of neutral acetate of lead, in such a manner that all the mangostine was not precipitated by the addition of a small quantity of ammonia. The precipitate thus

produced was gelatinous, yellow, insoluble in water, slightly soluble in alcohol, and decomposable by acids. When dried at 212° F., it could be pounded into a light yellowish-green powder, which when heated burnt away quietly without scintillation. Analysis led to the formula $2(C^{40}H^{22}O^{10}) + 5PbO + HO$:—

	Found.		Calculated.	
Carbon,	38.67	80	6000	38.37
Hydrogen,	3.45	45	562.5	3.59
Oxygen,	13.74	21	2100	13.46
Oxide of lead,	44.14	5	6972.5	44.58

This lead compound is not always of the same composition, for in two analyses of a compound prepared at another time the author obtained 37.85 and 37.46 per cent. of oxide of lead.

Several other bodies, obtained from plants of the same natural family (*Guttiferæ*) as the *Garcinia mangostana*, appear to possess a certain relation with mangostine, both in regard to their formulæ and chemical properties.

According to Johnston, gamboge obtained from *Garcinia gutta* has the formula $C^{40}H^{18}O^{21}$. From this it appeared probable that mangostine might be obtained by the oxidation of gamboge. The author accordingly treated the latter substance with hot concentrated nitric acid, and obtained a crystalline body which appeared to possess reactions exactly analogous to those of mangostine.

Indian yellow (purree), which is said to be obtained from the deposite of camel's urine after the animals have eaten the fruit of *Mangostana magnifer*, consists principally of euxanthate of magnesia; the acid of this salt has the formula $C^{40}H^{16}O^{21}$. Hence it appears possible that both mangostine and gamboge may be converted into euxanthic acid by passing through living bodies.

From this the author was induced to make some experiments with euxanthic acid, from which it appeared that this acid is a conjugate compound. Thus if it be treated with concentrated nitric acid, and the fluid be poured into water, euxanthone separates. The fluid filtered from this substance has the property of reducing peroxide of copper dissolved in potash, a power possessed neither by euxanthic acid nor by euxanthone.—*London Chem. Gaz. from Liebig's Annalen*, xciii. p. 83.

ON URSONE, A NEW SUBSTANCE FROM THE LEAVES OF
ARCTOSTAPHYLOS UVA URSI.

By H. TROMMSDORFF.

The author has prepared a new crystallizable substance from this plant, to which he gives the name *ursone*. An alcoholic extract of the leaves was made, the watery solution of which was employed in the preparation of arbutine according to Kawalier's method. The green residue remaining after the solution of the extract in water was repeatedly washed with ether, then decocted with alcohol, and the alcoholic fluid filtered whilst boiling. On cooling, it deposited a substance in fine crystals.

This substance is most easily obtained by exhausting the coarsely powdered leaves of the plant with about an equal weight of ether, in Mohr's apparatus for extraction with ether. An abundant deposit of crystalline powder is found in the dark green ethereal extract; this is washed with ether and recrystallized from alcohol.

The substance forms fine, colorless, silky, acicular crystals; it is tasteless and inodorous, insoluble in water, dilute acids and alkalies, and difficult of solution in alcohol and ether. It fuses by heat into a colorless liquid, which solidifies on cooling, forming a transparent, amorphous, cracked mass. At a higher temperature it boils and volatilizes, apparently unchanged, forming a white sublimate on the cold side of the vessel. In contact with the air, it burns completely, with a yellow smoky flame, without leaving any cinder. Concentrated solution of potash appears to have no action upon it either when hot or cold. Concentrated sulphuric acid gives it an orange-yellow color, without dissolving it completely, although the liquid also assumes this color; when heated, the color passes to brown, and at last carbonization takes place with evolution of sulphurous acid. Fuming nitric acid dissolves the substance with a slight evolution of nitrous acid, forming a clear yellow fluid, from which a white body is deposited in abundance on the addition of water.—*Ibid.* from *Archiv der Pharm.*, lxxx. p. 274.

THE QUICKSILVER MINES OF OLD AND NEW ALMADEN.

Quicksilver or mercury has been known from the earliest ages, but is found nowhere in such large quantities as in Spain and California. Almaden, in Spain, has long been famed for its mines of this metal, which, according to Bowles, are the richest in their produce, the most instructive as to the mode of working them, the most curious for their natural history, and the most ancient in the world. We find them mentioned in Theophrastus, 300 years before Christ, and Vitruvius also speaks of them. Pliny places Cisapona, or, as it is sometimes written, Sisapona, in Bœtica, and says that this mine was kept sealed with the greatest care, and was only opened to take the quantity of cinnabar necessary for the consumption of Rome. (*Nat. Hist.*, xxiii., 7.) The Romans considered this mineral poisonous; but notwithstanding this, their matrons painted their faces with it, and their painters employed it as a pigment. The Romans certainly worked this mine, but no traces remain of their labors. The Moors, owing perhaps to some prejudice, did not work it.

In the *Introduction à la Geografia Fisica y la Historia Natural de Espana*, we read that "the country about Almaden abounds in iron mines; and what is more surprising, in the same mine we find iron, mercury and sulphur mixed, so as to form one mass. The neighboring hills are formed of the same stone, and on all of them the same plants grow; from which we may infer that the mercury does not possess any poisonous quality, as is generally supposed, injurious to vegetation.

"The brothers Mark and Christopher Függer, of Germany, undertook to work this mine, and contracted to give the government 4500 quintals of mercury annually; but not being able to fulfil their promise, they abandoned it in 1635, together with the silver mine of Gualcanal, which they also had. While connected with those mines, however, their riches became proverbial in Spain, and their descendants live at present in Germany, with the rank of princes. A branch of this family afterwards took the mine, and worked it till 1645. In the following year the government undertook the management of it. Don Juan Bustamento established the furnaces, and also troughs for cooling the metal. These furnaces are twelve in number, and are called by the names

of the twelve apostles. Each is capable of containing ten tons weight of ore. The furnace is kept burning for three days, and the same period is required for cooling."

Mr. Russell Bartlett, the United States Commissioner on the Mexican and United States Boundary Question, who visited California in 1853, gives the following account of the New Almaden Mine:—

"New Almaden consists exclusively of the buildings belonging to the company which owns the quicksilver mine. It embraces furnaces, storehouses, dwelling-houses for the officers and laborers, offices, mechanics' shops, &c. Many of them are of wood, but a large and fine range of substantial brick buildings is now in the process of erection, to take the place of the wooden ones. The novelty of the business of extracting the quicksilver from the cinnabar required a number of experiments, involving a very heavy expenditure; for there were few mines in the world where the operation was carried on on a large scale, and it could not be expected that a rival company like this, whose operations would effectually interfere with the trade the latter had for ages enjoyed, would be permitted to derive any information from their long experience. Machinery of various kinds was therefore imported from England and the United States at enormous cost, much of which has since been rejected, either on account of the great expense of running it, or its inadequacy to perform the service required. Six furnaces are now in operation reducing the ore, all of which seem to be alike, and of the most simple construction. The ore, when brought from the mine and deposited near the furnaces, is separated according to its quality. The larger masses are first broken up, and then all is piled up under sheds near the furnace doors. The ore is next heaped on the furnaces, and a steady, though not very strong fire is then applied. As the ore becomes heated the quicksilver is sublimed, and then being conducted by pipes which lead along the bottom of the furnace to small pots or reservoirs imbedded in the earth, each containing from one to two gallons of the metal. The furnaces are kept going night and day, while large drops or minute streams of the pure metal are constantly trickling down into the receivers. From these it is carried to the store-house, and deposited in large cast-iron tanks or vats. These are of various shapes and sizes, and are fixed in solid beds of stone and mortar. The

largest, a square vat between four and five feet across, contained twenty tons of pure quicksilver. Seven or eight days are required to fill the furnaces, extract the quicksilver, and remove the residuum, the latter being the most dangerous part of the process. All is done as much in the open air as possible, the furnaces being merely protected by a roof.

"In the warehouse, the metal is prepared for the market. This is done by putting it into wrought iron flasks or bottles, holding about seventy-five pounds each. The quicksilver is dipped up with ladles, and poured into the bottles through an ordinary tin funnel. The opening or neck of the bottle is then stopped with a close-fitting screw, put in with a vice, so as to make it as tight as possible. These bottles, which weigh twenty-five pounds each, are all made in England, where they can be furnished much cheaper than in the United States. From the warehouse the metal is transported by ox-carts to tide-water about twenty miles distant, whence they are shipped to San Francisco. A shipment of a thousand bottles was lately made to Canton, by way of an experiment. In China it is chiefly used in the manufacture of vermilion and other articles of commerce. The quantity of quicksilver produced at New Almaden is about 1000 bottles per month, or nearly 1,000,000 lbs. per annum.

"The mine whence the cinnabar is obtained contains veins of ore extending in every direction, sometimes horizontal, then perpendicular, and again at every inclination. Their whole extent now exceeds 7000 feet. When a vein is struck, it is followed as far as it can be with safety, whatever may be its course. Some of the veins are five feet in diameter, others half that size. Some are also richer than others. In each of the veins is a single miner, for not more than one can work to advantage in these narrow recesses. Picks, drills, and crowbars are the tools employed.

"The miners, and those who merely handle the cinnabar, are not injured thereby; but those who work about the furnaces, and inhale the fumes of the metal are seriously affected. Salivation is common, and the attendants on the furnaces are compelled to desist from their labor every three or four weeks. When a fresh set of hands is put on. The horses and mules are also salivated, and from twenty to thirty die every year from the effects of the mercury.

"This mine was long known to the Indians, who resorted hither for the vermilion, which they could collect from the cinabar. They had dug some thirty or forty feet into the mountain; but it does not appear ever to have been worked by the Spaniards. In recent times its commercial value was first discovered by Senor Castellero, who became its legal owner. Don José Castro, who subsequently became proprietor of it, sold his interest to Barron & Forbes, an English house doing business in Mexico. Another partner is Mr. Walkinshaw, an English gentleman, long resident in Mexico, and well skilled in mining. This gentleman now resides at New Almaden. Mr. Young is the superintendent of the mine, and Mr. Beston is the engineer.

"During the year 1853, the total exports of quicksilver from San Francisco amounted to 1,350,000 lbs., valued at 683,189 dollars. All this, together with the large amount used in California was the product of the New Almaden mine. The following shows to what points the quicksilver was exported:—Hong Kong, 423,150 lbs.; Shanghai, 60,900 lbs.; Canton, 27,450 lbs.; Whampoa, 22,500 lbs.; Calcutta, 3,750 lbs.; Mazatlan, 210,825 lbs.; Mazatlan and San Blas, 19,125 lbs.; San Blas, 145,652 lbs.; Callao, 135,000 lbs.; Valparaiso, 148,275 lbs.; New York, 138,375 lbs.; Philadelphia, 75,000 lbs.—*London Pharm. Journal*, 1855.

ON THE FRANKINCENSE TREE OF WESTERN AFRICA. (DANIELLIA THURIFERA, BENNETT.)

By W. F. DANIELL, M.D., F.L.S.,

Honorary Member of the Pharmaceutical Society.

The tree that furnishes the product termed African Frankincense, though of plentiful growth in the peninsula of Sierra Leone and circumjacent regions, appears hitherto to have escaped the attention of the voyagers and travellers who for so many centuries visited this part of the coast. The knowledge, therefore, with reference to its existence, can only be limited to a comparatively recent period, or within the present century. No mention has been made of this substance in the works of either Afzelius or Winterbottom, and all the information to be obtained is a traditional rumor that vaguely ascribes the discovery of its

odoriferous qualities to one of those enterprising Jesuit missionaries who visited Africa during the sixteenth century. This personage carried with him to Europe, on his return, a small sample of this gum, and so highly were its fragrant properties appreciated, when used in lieu of the ordinary incense, that this production would have become a valuable commercial export, had not the premature death of the priest, from the debilitating effects of climate, rendered abortive all attempts to ascertain the source from whence he had derived his supply.

The negro communities of tropical Africa, especially the female portion, have from a primitive age been in the habit of selecting several fragrant and aromatic gums, woods, roots, and leaves, with a variety of other substances from the vegetable kingdom, as articles of perfumery, to remove the disagreeable fœtor of the skin, and sometimes for the celebration of their religious and funeral rites, or with the object of adapting them to medical purposes. It is probable that under the authority of these sacerdotal customs, the *Bdellium* (*Heudolatia Africana*, Rich.), Copal, and the produce of other gummiferous trees, have attained a greater degree of importance among some nations than others, on account of their more exclusive appropriation to such ceremonies, and from the agreeable odor diffused by their combustion. On the other hand, the *Cyperus odoratus*, Lin. (?); *Ricinus Africanus*, Willd.; *Bassia Parkia*, R. Br.; *Arachis hypogæa*, Willd.; *Tuculla*, a species of Redwood; *Sesamum orientale*, Willd.; *Pentadesma Butyracea*, Don.; *Carapa Touloucouna*, Rich.; *Citrus Limetta* and *Aurantium*, Risso; *Daniellia Thurifera*, Btt.; *Elais Guineensis*, Willd.; and *E. melanococca*, Gært., and other sweet-scented roots and plants, are more generally devoted to personal appliances, and are proportionately esteemed, for their prophylactic efficacy in some cutaneous maladies.

The Frankincense tree grows to a large size, and may be distinguished without difficulty, by the erect and stately trunk and beautiful foliage. When of advanced age, its recognition is rendered still more certain by the peculiar grey or ash-like color of the bark, and massive divergent branches, which expand into a mass of foliage at an altitude of fifty or sixty feet from the ground, to a considerable distance around.

The mountainous districts to the westward of Freetown, and

the wooded slopes in the neighborhood of York, Lumley, and Goderich villages, are the localities in which it principally abounds, although it has been observed on the banks of the Sherbro and other adjoining rivers. If any credit can be attached to the assertions of several Ako' colonists, the same production has been met with on the forest declivities of Fernando Po, and is stated to be equally common in Yorruba, where it is known by the appellation of *Ogea* or *Ojeah*. This plant would therefore appear to be indigenous to various countries of the African continent, could any reliance be placed upon these reports; they cannot, however, be received with implicit credence, and until subsequent observations verify their correctness, must continue to be of doubtful value.

In Sierra Leone, the Timmané or Soosu designation of *Bungbo*, usually pronounced *Bungo*,* under which the gum is sold by the native traders, has also been conferred on the tree producing it, and hence the source of the term Bungo tree. A few of the more remarkable botanical characteristics of this production demand a brief notice. During the early years of growth, the young plant has the bark of a deep brown, which changes gradually in color as it enlarges in magnitude. When of moderate size, the entire circumference of the trunk is studded by a series of horizontal excrescences, or oblong elevations in the cortical covering, of a pale or yellowish-brown hue, appearing in dense parallel but disconnected strata, a quarter of an inch or more apart, and varying from one-sixth to one inch in length, and about one or two lines in breadth. Being of a lighter tint than the surrounding portions, they are distinctly perceptible, and answer as a diagnostic peculiarity to identify the lesser shoots. As the tree approaches maturity, these elevated projections proportionately diminish, and the cortex, while partially retaining its smoothness, becomes traced by irregular patches of white or grey. In the course of time, these patches enlarge to that extent as to embrace in many instances the entire surface of the exterior. The inner cortical layers in plants of an immature development present a peculiar fibrous character, are delicately organized, and

* "The fragrant gum called Bungo is the principal material one mason here uses for his dwelling."—*A Residence in Sierra Leone*, p. 218, Ed by Mrs. Norton.

may be peeled off in smooth ribbon-like layers, which cannot be effected in the older specimens.

The gum, when of a natural exudation, mostly appears in a liquid state, of a white or pale straw color, in some seasons oozing so copiously from the branches, that the ground and shrubs beneath are, from successive excretions, thickly covered with white spots. This effusion, however, does not occur so abundantly from the cortex, and when so produced, appear in thin and shallow layers, that mark their course by whitish streaks, that after their exsiccation on the trunk, present all the aspects of a saline efflorescence. The gum while in this state of fluidity cannot be collected for ordinary use. The substance offered for sale is widely different, from the effect of certain indirect agencies, tending to considerably modify both its qualities and secretion.

The Frankincense tree is subject to the attack of a certain insect, termed by the natives *Tumbo*, which deeply perforates the bark in various directions. Its progress is attended by long and sinuous passages, the woody *debris* from which is ejected externally by a circular orifice about an inch in diameter. In the course of a few days, the gummy liquid issues largely from this aperture, blended with minute ligneous particles, which in their transit through these excavations, acquire a ruddy or brown tint, by degrees accumulating in small masses, and falling to the earth. In this state they become converted into dark brown fragments after a short interval, and are then gathered by the negro women and children, who resort to the woods with the express purpose of collecting them. Another mode of procuring this gum consists in stripping the dead or unsound bark from the wood, the more decayed portions of which are commonly saturated by the gummy exudation, and are found amalgamated with the woody fibre beneath in black crusts.

Great uncertainty prevails with reference to the period at which this tree flowers. Several colonists remark that they have not hitherto been seen, and the majority appear to be as equally ignorant on the subject. I observed the pod, however, was in a green condition early in March, from whence we may infer that the flowering probably commenced in December or January. The fruit is a coriaceous, thin, and dehiscent legume, from two to two and-a-half inches long, and one to one-and-a-half inches

wide, of an irregular ovate or semilunar shape, when ripe of a pale yellow color, and bursting into four segments, two inner and two outer, previous to their fall from the branches. Between the suture of the two former is embodied a solitary, flat, ovate-oblong, and chocolate-colored seed, which usually detaches itself from the sutures as they expand, and is suspended by a firm, funicular attachment to the inner surface of one of the external segments. The leaves are bipinnate, of a pale green, pervaded by a greyish tint, that also characterises the trunk. In the younger productions they are of larger development, but the pinnæ are less numerous than in those of a later growth. It is unnecessary for me to enter into any further botanical details, after the able delineation of the plant by Mr. Bennett in the *Pharmaceutical Journal* for last November.

Two kinds of frankincense, brought from the circumjacent villages, may be found in the market of Freetown, both of which are evidently the produce of the same tree. The first can be partly recognized by the dark brown, or black shining and irregular fragments, from apparently having a larger amount of gum blended with the woody fibre than the other, which is met with in smaller and less compact pieces, more friable, and of a lighter brown or yellow tint, being chiefly constituted of manifold white, woody particles, cemented into masses by the excreted gum. Of these two varieties the latter is the least valued. They are, nevertheless, usually found intermixed in the samples offered for purchase.

The incense-like fragrance peculiar to these woody-resinous excretions, renders them available for a variety of uses. Occasionally they are had recourse to for the fumigation of houses in cases of sickness, but their ordinary appliance in the Sierra Leone districts, is that of a perfume among the native females. With this view they triturate the gum with lime manufactured from sea-shells, between two purposely adapted stones, and after their reduction into a fine powder, rub their bodies with it.

The bark, though endowed with similar odoriferous properties to a limited degree, is seldom or never resorted to for any personal or domestic employment. The ignition of the gum is rapid: a bright yellow flame, attended with a black or carbonaceous smoke, resulting. This is followed by the deposition of a

viscid oleaginous matter, and the evolution of a remarkable aromatic and semi-resinous odor, approximating to that produced from the common pastiles, for which they would form not an inappropriate substitute, either in the sick chamber, or on such occasions where an agreeable impregnation of the atmosphere was required.—*Pharmaceutical Journal*, March, 1855.

ON THE ADVANTAGES OF THE TWADDLE'S AREOMETER OVER
THOSE OF BEAUME AND BECK.

By Dr. BOLLEY.

It appears very desirable to call the attention of chemists to Twaddle's areometer, not merely because the specific gravities of fluids heavier than water are always expressed in accordance with this instrument in the copious technical literature of England, but also because this areometer has great advantages over those in use on the continent, and deserves to take their place. In all the chemical factories of England which the writer had an opportunity of visiting, he became convinced that Twaddle's areometer fully deserved the estimation in which it is held by German and French manufacturing chemists who visit England, even though previously accustomed to Beaumé's

The advantages of this instrument are,—1st, that for the distinction of the specific gravities between 1.000 and 2.000, it contains 200 degrees, so that it indicates much smaller differences in the density of fluids than Beaumé's areometer, which has only 76 degrees between 1.000 and 2.000 spec. grav. One bad result of such a more exact division would be the necessity of employing a very long scale, or having very small degrees; but both these disadvantages are to a certain extent avoided by making the entire apparatus consist of six areometers, of which the first ranges from 0° to 26°, the second from 24° to 60°, and so forth. The whole scale of degrees thus reaches a length of about 26 inches.

2. Each degree represents a *constant progression* of the specific gravity, so that, supposing we know the very simple principle of the division, on reading off the degree we immediately obtain the corresponding density of the fluids. The principle of this division is as follows:—The specific gravity of water being set at 1.000,

every increase of density equal to 5 unities is represented by, degree; thus—

1° Twaddle	= 1.005
2°	= 1.010
7°	= 1.035

The degree has consequently only to be multiplied by 5, and the number thus obtained added to 1.000, and we obtain the specific gravity of the fluid under examination.

Hence it follows that this areometer is one with a *rational* scale and a further consequence is that the degrees must be of *unequal* length.

That the employment of this instrument would essentially simplify some calculations is evident from the following:—

1. A gallon (English) of distilled water weighs 10 lbs. (English). By sinking Twaddle's instrument into a solution, an acid, &c., and multiplying the degree obtained by 5, we readily learn the weight of a gallon of the latter fluid. For instance, an acid of 50° Twaddle has the spec. grav. 1.250, and the gallon consequently weighs 12½ lbs.; the gallon of another of 5° Twaddle weighs only 10¼ lbs.

2. With French measures and weights, the matter becomes still more simple; 1 litre of distilled water weighs 1000 grms; 1 litre of a fluid, say of 20° Twaddle, therefore weighs 1100 grms., i. e. $1000 + 20 \times 5$ grms.

3. If an acid or solution of a given degree is to be diluted to a lower strength, how much water must be employed. For instance, sulphuric acid of 170° Twaddle is to be diluted to 6°. The proportion for dilution is obtained by the division of 170 by 6; the quotient is 28.333; that is to say, when 1 litre of acid of 170° Twaddle is diluted to 28.333 litres, or in other words when 27.333 litres of water are added to it, we obtain a fluid of 6° Twaddle, for 170° Twaddle represents the spec. grav. 1.850 and 6° Twaddle, the spec. grav. 1.030, consequently the 28.333 litres contain 27.333 litres of water, 1 litre of sulphuric acid weighing 1.850 gm.; the weight of the whole is $27.333 + 1.850$ gm. = 29.183 grms.; hence, by dividing the total weight, 29.183 grms., by the volume, 28.333 litres, we obtain the spec. grav. 1.030.

If it were desired to perform a similar calculation with the

areometer of Beaumé or Beck, considerable errors would be induced.

From this it may readily be seen, that from an observation with Twaddle's areometer certain sound conclusions as to the nature of the fluid may be deduced; whilst Beaumé or Beck's instruments not only give imperfect and arbitrary results, but their indications do not stand in connexion with the nature of the substance under investigation.—*London Chem. Gaz.* Jan. 1, 1855, from *Schweiz. Gewerbebl.*

ON THE BEHAVIOR OF PALM-OIL WHEN HEATED.

By DR. J. J. POHL.

The melting-points of palm-oil, as observed by different chemists, present great discrepancies. This would lead at once to the conclusion, that the oil has not always the same constitution, a supposition which acquires still greater probability from the circumstance that the oil is obtained from the fruits of various palms, such as *Avoira elais*, and species of *Areca* and *Cocos*.

The author has determined a series of melting-points. Oil from various merchants and of different age, exhibited very different melting-points. One sample (A), $94^{\circ}8-95^{\circ}2$ F.; another (B) on an average, $94^{\circ}1$ F.; and a third, (C) $76^{\circ}5-76^{\circ}9$ F. Very old palm oil, which had been kept at least two years, melted at $105^{\circ}8-106^{\circ}16$ F.

The oil A, kept melted a considerable time in contact with the air at $190^{\circ}-199^{\circ}$ F., exhibited a melting-point of $99^{\circ}5$ F. The fat, purified by filtration whilst hot, was then exposed to a higher temperature. At 239° F. the fat employed began apparently to boil, probably in consequence of the evaporation of a small quantity of water which it might contain; this ceased at $368^{\circ}6$ F. But even at 294° F., very acid, pungent white vapors began to be formed (exhibiting no resemblance in odor to acroleine); these became very troublesome at 374° F., although the weight of the substance thus volatilized was inconsiderable. At $474^{\circ}8$ F., boiling did not take place. The palm-oil then had a dark-brown appearance; but a portion of it, poured into cold water to cool it rapidly, no longer showed any trace of the yellowish-red color;

the palm oil was bleached in this manner; and although still somewhat brownish, was quite as white as the best palm oil bleached according to Payen's method. It had the consistence of hog's lard, an empyreumatic odor, the peculiar odor of palm-oil having entirely disappeared, and a wax-like taste. The portion of the heated palm-oil which had not been poured into water was still fluid after standing two hours at $72^{\circ}5$ F., and the separation of a solid body only commenced in three hours. After nineteen hours, a third part was still fluid, and a brownish-red oil flowed spontaneously from the fatty mass, amounting to about one twenty-fifth of the whole. In the course of sixty hours, even this oil solidified into a brownish-white mass. The bleaching of palm-oil therefore takes place under the above circumstances in a short time, as completely as by Payen's process in ten or twelve hours.

It was now to be ascertained whether the access of light and air was necessary for the bleaching; and to settle this point, palm-oil was heated in a covered vessel, and in the dark, to 475° F., and left to cool after exposure to this temperature for ten minutes. The palm-oil was, as before, completely bleached. At this high temperature, therefore, the destruction of the yellowish-red coloring matter is not affected either by the action of light, or by oxidation at the expense of the atmospheric oxygen.

To find the lowest temperature at which this rapid bleaching can be advantageously effected, palm-oil was heated in twenty-four minutes to 410° F., and kept at this temperature for six minutes; on cooling it was certainly lighter in color, but not perfectly bleached. Heated in fifteen minutes to 419° F., and kept in this temperature for fifteen minutes more, the palm oil was lighter in color than in the preceding case, but still not sufficiently bleached. When kept at $469^{\circ}4$ F. for fifteen minutes, it appeared completely decolorized. Lastly, when palm oil was heated in twelve minutes to 464° F., a sample drawn at once still retained a yellow color; but in five minutes it was colorless. From the above experiments it appears that when palm-oil is quickly heated to 464° F., and kept for a few minutes at this temperature, it is perfectly bleached without access of air or light. The author has not only tried this mode of bleaching on a large scale, but it has been carried out for three years in a manufactory. The heating of the palm-oil is effected as rapidly as possible in cast-iron pans; it is

kept for ten minutes at a temperature of 464° F., and the bleaching is then completed. Ten or twelve hundredweights of palm-oil may be conveniently heated in one pan, which must, however, only be two-thirds filled, as the palm-oil expands greatly by the heat. It must be covered with a well-fitted cover, which prevents inconvenience from the above mentioned acid fumes. The palm-oil acquires a purer white color when operated upon on a large scale, than when treated in small quantities; it furnishes a very fine, solid white soap. The empyreumatic odor which occurs immediately after the bleaching, is lost after some time, and the original violet-like odor of the palm-oil again returns. The soap prepared from it has also a pleasant violet-like odor, as the empyreumatic smell entirely disappears during saponification. Palm-oil which is much contaminated with vegetable matters should be melted at a lower temperature before bleaching, so as to allow the impurities to settle. The best samples of palm-oil never contain more than from 0.3 to 1.0 per cent. of such impurities.

If palm-oil be heated to 572° F. with access of air, it begins to boil, and a strong odor of acroleine is perceptible. Distillation, carried on at 572° – 592° F., proceeds very slowly, as the vapors formed are heavy and readily condensable; but if ordinary steam be allowed to flow into the fatty mass heated to 572° F., the distillation takes place very quickly. At the commencement of boiling the palm-oil froths much, and easily passes over into the receiver; but in a few minutes this frothing ceases, and the distillation goes on without further disturbance.

The author has effected the distillation of quantities of from 30 to 50 pounds of palm-oil. If the fat be in contact with atmospheric air at the point of distillation, acroleine is formed with the mixture of fatty acids which passes over. The action of this substance on the lachrymal glands and the organs of smell and respiration is terrible. The same odor is acquired under these circumstances by the products of distillation, and they cannot be freed from it even by boiling with water. But if care be taken that, when palm-oil has reached the temperature of 572° F., all atmospheric air shall have been expelled from the apparatus by steam, not the smallest odor of acroleine makes its appearance during the distillation, which takes place without any trouble to the workman. At the end of the operation, a blackish-brown fluid remains in the distilling vessel, which on cooling sets into a tough and

elastic mass, and may be employed as an ingredient in the production of common soap, in the preparation of engine-grease, &c.

From the crude palm-oil purified by fusion, from 68 to 74.6 per cent, of fatty acids were obtained by distillation. The color and consistence of the distillate is not the same at different periods of the operation. At first from 25 to 30 per cent. of perfectly colorless fatty acids come over rapidly; these, when solidified, form a solid mass; after this, the products of distillation pass more slowly, always becoming more greasy on cooling, and more and more of a brownish color. The empyreumatic odor of the fatty acid is lost in time, giving place to a waxy odor. If the colorless product of distillation be kept in a fused state for a considerable time, even at a low temperature, or repeatedly fused, it gradually acquires a darker color, and at the same time becomes softer.

Determinations of the melting points of the fatty acids obtained by distillation gave the following results:—

First Experiment.—The first half of the distilled fatty acids, which was of a slightly yellowish-white color, was,—I. transparent at 105° F., and melted at $117^{\circ} \cdot 5$ F.; II. transparent at 104° F., and melted at $117^{\circ} \cdot 5$ F.

The second half of the distillate, of a strong brownish-white color, was,—I. transparent at $101^{\circ} \cdot 3$ F., melted at $110^{\circ} \cdot 7$ F.; II. transparent at $107^{\circ} \cdot 8$ F., melted at $110^{\circ} \cdot 9$ F.

The second half of the distillate, after complete cold pressure, fusion with water to which 0.25 per cent. of oxalic acid had been added, and fining with white of egg, had a slightly brownish-white color; it was,—I. transparent at $107^{\circ} \cdot 4$ F., fused at $121^{\circ} \cdot 5$ F.; II. transparent at $101^{\circ} \cdot 7$ F.; fused at $120^{\circ} \cdot 7$ F.

II. is a mere repetition of the determination of the melting-point of the mass serving for the first experiment (I).

Second Experiment.—The products of distillation were collected in five separate portions. The percentage proportions, compared with the entire distillate, were for the first portion 1.21 per cent., 2.28 per cent., 3.17 per cent., 4.9 per cent., 5.25 per cent.

The determinations of the melting-points gave the following results:—Portion 1, transparent at $111^{\circ} \cdot 9$ F., fused at $124^{\circ} \cdot 5$; 2, transparent at $103^{\circ} \cdot 1$ F., fused at $114^{\circ} \cdot 4$; 3, transparent at $103^{\circ} \cdot 1$ F., fused at $113^{\circ} \cdot 7$ F.; 4, transparent at $103^{\circ} \cdot 1$ F., fused

at $113^{\circ}\cdot7$ F.; 4, transparent at $103^{\circ}\cdot1$ F., fused at $111^{\circ}\cdot9$ F.; 5, transparent at $99^{\circ}\cdot1$ F., fused at 109° F.

The colored fatty acids obtained by distillation may easily be prepared colorless by recrystallization from alcohol. The author found the melting-points of several portions of such purified fatty acids to be:—

1st crystallization	$138^{\circ}\cdot4$ F.
2nd crystallization	$140^{\circ}\cdot7$ F.
3rd crystallization	$138^{\circ}\cdot9$ F.
4th crystallization	$137^{\circ}\cdot5$ F.

For comparison with the above determinations of the melting-points of the products of distillation of palm-oil, the author gives the following results obtained by him with fatty acids, obtained by the processes of Masse and Tribouillet, by treating palm-oil with sulphuric acid, and subsequent distillation with superheated steam.

The distillate of palm-oil, obtained in the year 1851 directly from the manufactory at Neuilly, and of a pure white color, was,—I. transparent at $98^{\circ}\cdot5$ F., fused at $106^{\circ}\cdot9$ F.; II. transparent at $94^{\circ}\cdot1$ F., fused at $106^{\circ}\cdot5$ F.

The second portion of the distillate, obtained from the same manufactory, but pressed, and of a dazzling white color,—I. became transparent at $106^{\circ}\cdot7$ F., fused at $123^{\circ}\cdot1$ F.; II. became transparent at $108^{\circ}\cdot5$ F., fused at $120^{\circ}\cdot9$ F.; III. became transparent at $108^{\circ}\cdot5$ F., fused at $120^{\circ}\cdot5$ F. The second and third determinations were repetitions of the first with the same mass of fatty acids.

Palm-oil distillate, from the close of the operation, also from Neuilly, crystallized and pressed, also of a dazzling white color,—I. became transparent at $109^{\circ}\cdot2$ F., fused at $120^{\circ}\cdot4$ F.; II. became transparent at $109^{\circ}\cdot4$ F., fused at $120^{\circ}\cdot4$ F.

After keeping for two years exposed to the light, the substances, which were originally pure white, acquired a somewhat brownish tinge.

Fatty acids, prepared in Vienna according to Tribouillet's method, as employed in August, 1851, in the production of the Belvidere candles, and of a brownish-white color, became transparent at $103^{\circ}\cdot1$ F., and fused at $118^{\circ}\cdot9$ F.

Fatty acids, afterwards prepared in Vienna, were pure white, like those produced in France, and their melting-points agreed pretty well with those of the latter.—*Chem. Gaz., from Sitzungsber. der Akad. der Wiss. zu Wien*, xii, p. 80.

ON THE SAPONIFICATION OF OILS UNDER THE INFLUENCE
OF THE SUBSTANCES WHICH ACCOMPANY THEM IN SEEDS.

By J. PELOUZE.

Since the researches of M. Chevreul have assimilated fatty bodies to ethers or salts, and made known their decomposition into particular acids and glycerine by the action of hydrated alkalies, it was easy to see that analogous reactions would occur under other circumstances. Thus M. Fremy has shown that the oils and neutral fatty bodies in general are converted into fatty acids by concentrated sulphuric acid. The previous union of this acid with the oleic and margaric acids and glycerine does not at all diminish the final distinctness of the phenomenon of saponification. Beyond these two methods for the saponification of fatty bodies by bases and by acids, nothing certain has hitherto been stated regarding their acidification by other agents. I must however indicate the state of the question at the period when I commenced its study:—

“The foreign substances with which fatty bodies are contaminated exert the same action upon them that a ferment does upon saccharine fluids; the alteration which they undergo excites the decomposition of the glyceric compounds, the fatty acids are set free, as well as the oxide of glyceryle, which sometimes separates without decomposition, as in palm-oil, but is usually decomposed.” (Liebig, *Organic Chemistry*.) “The circumstances necessary for the fermentation of fatty matters are the same as those which occur in all fermentations. It requires the concurrence of an albuminoid body, water, air, and a temperature of from 59° to 86° F. Under these circumstances the substance becomes heated, and soon acquires all the properties of a rancid grease.” (Dumas, *Traité de Chimie*.) “Inodorous and tasteless oils, when in contact with air and moisture, acquire a disagreeable odor and a very persistent taste. Fleishy oleaginous fruits and crushed oleaginous seeds undergo a true fermentation,

the result of which is the disunion of the acids and glycerine. I have had occasion to observe a similar production of free acid during the putrefaction of seeds containing much fatty matter." (Boussingault, *Economie Rurale*.)

M. Bernard has proved that the pancreatic sugar rapidly resolves neutral fatty bodies into acids and glycerine. (*Comptes Rendus*, xxviii. p. 249 and 283.) M. Berthelot, in his thesis, says a few words on the acidification of neutral fatty matters, either natural or artificial, when in contact with the air; he attributes this transformation to the moisture of the atmosphere, and compares it with the decomposition which these same bodies undergo in closed vessels, by the action of water at a high temperature. Lastly, I may mention that seventeen years ago, M. Boudet and myself ascertained that the palm oil of commerce is a mixture of glycerine, of neutral fatty matter, and of acid, the proportion of the latter amounting sometimes to four-fifths of the weight of the oil.

I will not speak here of the slow alteration which fatty matters undergo in the air; this phenomenon, which is still so obscure, appears also to have only a very distant relation with true saponification; it is accompanied by an absorption of oxygen and an evolution of carbonic acid, which do not take place in saponification. The facts of which I am about to present an analysis indicate a very distinct resolution of fatty bodies into acids and glycerine, without the intervention of air. They may be stated shortly as follows:—

When oleaginous seeds are crushed so as to break up their cells, and bring the substances of which they are composed into close contact, the neutral fatty bodies contained in these seeds are converted into fatty acids and glycerine. In this case there is something analogous to what takes place in the grape, the apple, and many other fruits, the sugar contained in which is converted into alcohol and carbonic acid as soon as the cells which separate it from the ferment are destroyed.

Linseed, seeds of rape, mustard, poppy, groundnut, sesame, camelina and chamomile, nuts, walnuts, and sweet and bitter almonds, were pounded in a mortar; the oil taken from them *immediately*, either by pressure or by means of ether or benzine, did not contain any fatty acids, or only contained traces

of them. This first series of experiments, repeated several times, proved that seeds at the moment of division contained the whole of their fatty matter in a neutral state. This agrees with what is generally supposed.

At my desire, M. Bouquet, the director of M. Menier's large chemical establishments, caused a certain quantity of the greater part of the above-mentioned seeds to be ground to meal in his own presence, and sent me portions of this flour, packed in earthen vessels stopped with corks. In a few days I found that the whole of these flours contained considerable quantities of glycerine and fatty acids, which went on constantly increasing for several months. The bruised seeds being kept in closed vessels, there was every reason to think that the air had nothing to do with this reaction. I confirmed this supposition by bruising some of the seeds in which this sort of spontaneous saponification took place most readily, putting them into glass bottles, which they filled completely, and closing them with care. In a few days I obtained quantities of fatty acids which were always readily appreciable and sometimes considerable. Thus walnuts, reduced to a paste, and kept for five days at a temperature of 50° to 77° F., furnished an oil containing 9 per cent. of its weight of fatty acids; and another sample which was kept eight days, gave 15 per cent. Oil of sesame in eight days gave 6 per cent., in a month 17.5 per cent., and in three months 47.5 per cent. of fatty acids. Poppy-oil furnished nearly the same results. Sweet almonds, kept for three weeks, furnished an oil containing only $3\frac{1}{2}$ per cent. of fatty acid; and groundnut-oil at the end of a month contained 6.3 per cent., and in three months 14 per cent. Linseed and rapeseed, kept for three weeks, furnished an oil containing 5 and 6 per cent. of fatty acids.

The saponification in question appears to vary in its intensity, not only with the temperature, but also with the quantities of the bruised seeds employed. I have not yet met with an oil entirely saponified; the one which furnished the largest quantity of acid is poppy-oil. I kept some poppy-seeds reduced to powder, for four months in an earthen vessel; they then furnished an oil containing from 85 to 90 per cent of fatty acid.

I pass now from simply-divided seeds to the cakes produced in the extraction of oils on a large scale; these all contain fatty

acids, and if they be old, it almost always happens that they no longer contain oil, this having become entirely acidified. It would be interesting, in connection with this complete transformation of the neutral fatty matters into acids, to ascertain their influence in the alimentation of cattle, and to follow it from the commencement of this spontaneous saponification, that is to say, from the moment when the seed is crushed to the period of complete acidification. The oil-cakes contain, on an average, 10 per cent. of fatty matters, and it is not to be supposed that the neutral or acid state of these is a matter of indifference in the alimentation of animals.

When oleagineous seeds are reduced to powder, and moistened with water, putrefaction commences in a few days, and they then exhale a fetid and strongly ammoniacal odor. Far from containing more fatty acids than seeds simply crushed, they contain a good deal less; and it appears that the ferment, or the organic matter, whatever it may be, that fulfils its office, is destroyed, and ceases to act upon the neutral oils. I have in vain endeavored to isolate this matter.

In the course of my researches I have ascertained that the sugar which is contained in considerable quantity in walnuts, nuts, and sweet and bitter almonds, is identical with cane-sugar, and that these seeds contained no trace of glucose. Nearly the whole of the sugar remains in the cakes after the oil has been separated by expression. It is so abundant in the cake of the walnut, that when the latter is suspended in water, with a little yeast, an active fermentation is set up in the mixture in a few minutes, and this gives rise to a considerable quantity of alcohol, which may be readily separated by distillation.

In the determination of the proportion of fatty acids mixed with the oils, it is not sufficient to treat the mixture with absolute alcohol; this would lead to the most serious errors. I have, in fact, ascertained that in the presence of the fatty acids the neutral oils are able to dissolve in alcohol. When alcohol is mixed with oil, the addition of oleic acid to the mixture causes the solution of the latter; and if the oleic acid be in great excess in proportion to the oil, the addition of fresh alcohol produces no turbidity in the mixture.

I have made an experiment upon saponification, which I shall

mention here, although it has no connection with what has gone before, because I think it may explain why potash and soda, which are such energetic bases, nevertheless saponify fatty bodies far more slowly than lime. It appeared probable that this depended upon the circumstance, that milk of lime mixes with fatty bodies far better than a solution of potash or soda. The following experiment renders this explanation very admissible. When a neutral oil is dissolved in hot alcohol, and an alcoholic solution of potash is added to it, the mixture, if brought to boiling, is instantly saponified; water does not separate from it the least trace of fatty matter, and the addition of muriatic acid to the solution furnishes fatty acids, which are completely soluble in alkalies and in alcohol. In the same way, if an oil be mixed with an excess of concentrated sulphuric acid, the saponification takes place instantaneously and completely; the whole of the oil is converted into sulpho-fatty acids and sulpho-glyceric acid. In the two cases here referred to, the saponification is immediate, because the bodies brought in contact and those formed, mix in all proportions, and thus present very numerous and intimate points of contact.

The saponification of neutral fatty bodies by potash or soda with alcohol instead of water as the solvent, might be usefully adopted in lectures, as it occupies almost less time in its realization than in its description; and hitherto this curious reaction, performed under ordinary conditions, required far too much time to be capable of execution, even on a very small scale, in the presence of an audience during a lecture. The same facility of execution applies also to the saponification of oils by concentrated sulphuric acid.

As I have mentioned the sulpho-fatty acids of M. Fremy, I may add that the residues of the purification of colza-oil are principally composed of these acids and sulphoglyceric acid. These residues, the price of which has almost suddenly risen from five francs to more than sixty francs per 100 kilogrms., are employed in tanning, and especially in the manufacture of beet-root alcohol, to destroy the froth produced during the fermentations. The manufacturers who make use of them should bear in mind that these residues are not, as they suppose, oil contaminated by the coloring and carbonaceous matters produced

by the action of sulphuric acid upon colza-oil, but that they contain principally double acids, and that they cannot furnish fatty acids without at the same time eliminating a certain quantity of sulphuric acid. A sample of one of these residues, sent to me from Lille by M. Kuhlmann, was entirely soluble in cold water, although from its appearance it might have been mistaken for oil. M. Thenard, who is the founder of the system of purifying lamp oils, now become one of the principal industries of the northern departments, observed that the purification does not take place well except with very concentrated sulphuric acid; this circumstance is now explained by our exact knowledge of the nature of the residue of the purification.

The new facts contained in the memoir of which the preceding is an abstract, are not without their application. Thus linseed-meal is either neutral or acid, according as it is new or old, and must consequently act differently, as a medicament. That which has long been prepared must be rejected, even though it may have been kept in well-closed vessels. I have several times found linseed-meal in the shops, in which all the oil is completely acidified. Milk of almonds, freshly-prepared, contains neutral oil of almonds; by the following day acidification has already commenced. Any edible oil will have a different composition and taste, according to the length of time that has elapsed before the seed from which it was extracted was submitted to pressure. The best oils for the table are those which have been extracted immediately after the crushing of the seed.

Old oil-cakes may be advantageously employed in the manufacture of an economical soap. All that is necessary is to mix them with an alkaline solution; but the quantity prepared must be small, as the albuminoid matter contained in them begins to decompose in about a fortnight, producing a very disagreeable odor.—*London Chem. Gaz.*, May 1st, from *Comptes Rendus*, March 19, 1855, p. 605.*

[The important bearing which many of the facts contained in this paper have on various preparations and processes in pharmacy, renders it worthy of a careful perusal by our readers. Many anomalies in the solubility of the fixed oils and of their tendency to rancify, may be cleared up.—*Ed. Am. Journ. Pharm.*]

ON A NEW PROCESS FOR ELECTRO-GILDING.

By M. BRIANT.

A modified process for this purpose has been proposed by a M. Briant, and has been the subject of a favorable report, made by M. Jacobi to the Academy of Sciences at St. Petersburg. It consists essentially in the substitution of the oxide for the chloride of gold in the preparation of the gilding-bath, and in the employment of a very feeble current of a constant or sustaining battery.

52 grms. (= 802.88 grs.) of gold are to be dissolved in nitromuriatic acid, and the solution evaporated, for the purpose of obtaining the chloride of gold dry, and as free as possible from acid. This chloride is then dissolved in 5 kilogrms. (= 11 lbs.) of hot water, and 100 grms. (1544 grs.) of well-sifted magnesia added, and allowed to digest at a moderate temperature. The oxide of gold which is separated is found in combination with the magnesia. The magnesia, well washed, is then treated with water acidulated with nitric acid, in the proportion of 375 grms. of acid to 5 kilogrms. of water. The magnesia is dissolved by the acid, leaving the simple hydrated oxide of gold, which is now thrown upon a filter and washed until it is quite free from acid.

It is with the oxide of gold, thus prepared, that M. Briant proposes to form his bath. He takes of—

Yellow prussiate of potash	500 grms.
Caustic potash	120 grms.
Water	5 kilogrms.

To this solution the oxide of gold with the filter is added, and the whole is boiled for twenty minutes. The oxide of gold dissolves, and there is formed at the same time a precipitate of sesquioxide of iron. It is allowed to cool, and is then filtered, by which a yellow liquid fit for use is obtained. The objects to be gilded should be well cleaned, and attached to the negative pole of an element of Daniell's battery, while a plate of platinum is attached to the positive pole.

The gilding may be effected either in a warm or cold solution; in the first case the deposit forms more rapidly, but with less delicacy. In order to obtain a durable deposit, analogous to

fire-gilding, several hours are required. When the liquid is exhausted of its gold, fresh oxide is added, by which a further precipitation of oxide of iron is produced. The gilding obtained by this process admits of being burnished, and of undergoing all the operations employed to produce *mat* or dead gold.

One of the most difficult problems to solve in this branch of manufacture is the production of dead surfaces. Although we know the nature and manipulation of the process, it is only the Parisian workmen who perfectly succeed in this field; hence it is that these operations are always conducted by French workmen, as well in native as in foreign establishments of importance.

The production of dead gold in the ordinary way is always accompanied by loss of metal, inasmuch as it necessitates a system of corrosion of the surface by chlorine. By Briant's process a matted surface can be obtained by galvanic agency not inferior to the best of Paris, while it does not require any of the subsequent operations required in fire-gilding. The mat appearance is spontaneously produced as soon as the coating of gold has acquired a certain thickness; it is most beautiful when the operation is carried on in the cold. By a very simple artifice a more or less reddish tint on the one hand, or a whitish one on the other, is produced; it is merely requisite to dilute the bath with more or less water.

When the objects to be gilded are polished and brilliant, the electro-gilding will also be brilliant, and it requires a longer time, and a thicker coating of gold to produce a deadened surface. It is therefore important to communicate, in the first instance, a deadened surface to the objects by the process employed in fire-gilding; or, more economically, by covering them at once with a thin pellicle of copper by the electric agency, which, as is well known, produces a beautiful matted surface. When any part of the object is to be protected from the action of the gilding process, the choice of the substances to be used in "stopping out" these parts is of importance, for it must be remembered that the bath is alkaline; for this purpose plaster impregnated with an alcoholic solution of lac is recommended. —*Chem. Gaz.*, April 16, from *Bulletin de la Société d'Encouragement*.

PATENT GRANTED TO LOUIS FAURE, FOR IMPROVEMENTS IN THE PROCESS OF MANUFACTURING IODINE.

This invention consists in the application and mode of applying sulphurous acid and chlorine to extracting iodine from the mother-liquors of nitrate of soda, and also from native nitrate of soda.

The following is the mode of treating native nitrate of soda and the mother-liquors therefrom, for extracting iodine therein contained in the state of iodic acid combined with soda, lime, or any other base:—Take about one quart of the mother-liquor of nitrate of soda of the strength of 36° to 37° Beaumé, and pour thereon, in small quantities, sulphurous acid held in solution in water from a graduated test-glass, continually agitating it until the precipitate of iodine freely separates from the liquid. When the liquid, which is slightly shaded, is filtered, it instantly loses its color, and gives no sign of a further precipitate of iodine on the addition of 1 drop of sulphurous acid. This test should be repeated upon about 10 quarts, and if the two results obtained correspond, 500 to 1000 quarts of mother-liquor can confidently be treated; for which it is merely necessary to employ a suitable proportion of sulphurous acid, and a vessel capable of containing a little more than three cubic feet of liquid.

The vessel to be employed should be of a circular form, and made of non-porous bricks, well luted, and afterwards lined with hydraulic cement. The diameter of the upper part of the vessel should be considerably less than that of the lower part, and should be hermetically closed by means of a wooden lid, well adjusted and lined internally with sheets of glass. The liquor is to be agitated in this vessel by means of a vertical shaft or agitator, provided with paddles, and set in motion by a winch and bevil-wheels. The paddles are inclined, and made of sandstone, and disposed for agitating violently the mother-liquors when the addition of sulphurous acid is made.

When the globules of gas which maintain part of the iodine precipitate on the surface of the liquor have been dispelled, the liquor is allowed to rest, and the supernatant liquor is then withdrawn by means of a sandstone siphon. The liquor is afterwards concentrated to extract the nitrate and sulphate of soda and chlorides of sodium and potassium.

The iodine precipitate is transferred to a sandstone fountain,

at the bottom of which a filter is formed, composed of successive layers of quartz-stone finely powdered, and the grain of which decreases in size from bottom to top. After the iodine has been sufficiently drained, it is drawn off without disturbing the lower layer of iodine, and conveyed to a rectangular box, made of plaster of Paris, closed by means of a lid of the same composition, sliding friction-wise in two parallel grooves. The lid of the box should be thick enough (but not too compact) to allow the water of imbibition to filter into the sides and lid of the box. When the iodine is sufficiently dried, it is crystallized by sublimation.

To extract iodine from the mother-liquor in the state of iodate and iodide, the liquors are treated successively with a solution of chlorine and sulphurous acid, previously tested in the following manner:—When the liquor contains little iodide and much iodate, the iodine contained in the iodide is first precipitated by means of chlorine; and as soon as the reaction is terminated, a sufficient quantity of solution of sulphurous acid for decomposing the iodates is added. If the mother-liquor contains much iodide and little iodate, a solution of sulphurous acid is first employed, and afterwards an aqueous solution of previously tested chlorine. Several cubic feet of the mother-liquors may be treated at a time with precision and facility.

The above processes are economical and expeditious, and have the advantage of avoiding the loss of nitrate of potash or soda during the concentration of the liquors, which result cannot be effected by the employment of sulphuric acid of commerce by the ordinary method.—Dated Feb. 14, 1854.—*Chem. Gaz.*, May 15, 1855.

ON LITHIUM AND STRONTIUM.

By M. BUNSEN.

(Extract of a Letter to M. Regnault.)

I send you a small specimen of lithium, which I have prepared in concert with Mr. Mathiessen by electrolysis. It forms a wire of several decimetres in length, and about three-fourths of a millimetre in diameter.

Lithium has the color and brilliancy of silver, from which it

would be impossible to distinguish it by its appearance; but it is so readily oxidizable, that the contact of the air blackens it immediately. It must be preserved in naphtha and in tubes deprived of air. Its ductility is so great, that I was able to draw out a small fragment weighing 5 milligrms. into a wire of several feet in length. It melts at 356° F., and is the lightest of all known solid or liquid bodies; its density does not exceed 0.5936. It burns with great brilliancy and a white light in oxygen, chlorine, and vapors of bromine, iodine and sulphur. It decomposes cold water immediately, with a brisk effervescence.

I also send a specimen of strontium, prepared in the same way by Mr. Mathiessen. The metal is in the form of a brilliant plate, of a bright brassy-yellow color. On touch-stone it leaves a brilliant line of a golden-yellow color, which however almost instantly becomes of a copper-red, in consequence of superficial oxidation. This metal decomposes water very quickly, even in the cold; it burns with a very brilliant white light in oxygen, chlorine, bromine, iodine and sulphur. Placed in a volatile circuit with calcium and water, it proved to be negative with regard to the latter metal, which is a very singular fact. Strontium is a very ductile metal; its density is 2.542, whilst that of calcium is only 1.584.—*Chem. Gaz.*, May 15, from *Comptes Rendus*, April 2, 1855.

PREPARATIONS FROM CANNABIS SATIVA IN INDIA.

(Extract of a Letter from C. J. Muller, Esq., dated Patna, October 28, 1853, addressed to Dr. Hooker.)

In India two varieties of intoxicating drug, prepared from the hemp-plant, are known in the bazaars,—one called *Ganja*, the other *Bhang*. In this part of India the *Ganja* is procured from the district of Rajshahye (north of Calcutta); *Bhang* comes chiefly from the districts of Tirhoot, Sarun, and Goruckpoor. In external appearance they differ considerably. *Ganja* is in the form of stalks, three or four feet long, with the inflorescence attached, the whole having been dried and pressed flat; the color a dirty brown, odor strongly aromatic and heavy, very resinous to the touch. This variety is highly intoxicating, which is accounted for by the abundance of resin (the *churrus* of Nepal and

other parts). Its retail price, deprived of stalks, is at the rate of about Rs. 200 per maund (80 lbs. avoirdupois), this high price being due to the weight of the tax imposed upon it by Government. *Bhang* is in the form of dried leaves without stalks, or at least with only fragments of stalks, and abounds in the dried inflorescence, apparently female. Its color is a dull green; it has not much odor, and is greatly deficient in resinous matter; its intoxicating properties are very slight.

Ganja is smoked somewhat in the same way as tobacco; its continued use invariably brings on severe asthma. *Bhang* is not smoked, but is ground up with water into a pulp, and mixed with other ingredients, so as to make a thick drink, called *Subzee*, reputed to be cooling, and highly conducive to health; people accustomed to use it enjoy excellent health, in fact never get sick.

Now it has always been a question with me whether the plants yielding *Ganja* and *Bhang* are identical; see O'Shaughnessy's *Dispensatory*, &c. The natives say that *Ganja*, like the Rajshahye drug, cannot be manufactured here nor in any of the neighboring districts. *Bhang* grows in abundance, and is absolutely wild in the Bhagulpoor and Tirhoot districts, springing up everywhere in the former like a weed. With the view of inquiring into the matter, I have raised several *Bhang* plants in my garden this year; they are now coming into flower. The plants which have completely flowered are, with the exception of one, to all intents and purposes, monœcious, while all the botanical books I have access to, make *Cannabis* strictly diœcious. The single plant, which appears to bear only female flowers, is not completely in flower yet. The male flowers come last and may yet appear, or I may have overlooked them. You will be interested, I think, in examining the inflorescence, and therefore I enclose some specimens. [They appear to be true *Cannabis sativa*.—Ed.] It is requisite to ascertain whether the Rajshahye plant presents the same character, and I have therefore sent to Rajshahye for specimens.

You will perceive that this subject is curious, as bearing upon the alleged fertilization of female flowers of the diœcious class, in the absence of the male plant; for example, *Cœlebogynne*, *Lychnis dioica*, &c. If diœcious plants have a tendency, under certain circumstances of soil and climate, to become monœcious,

the anomaly of fertilization in the absence of the male plant, is in a great measure removed. This remark rests, however, on the assumption that *Cannabis Indica*, *sativa*, *Ganja* and *Bhang*, are all identical, a point I think yet extremely doubtful; though I can scarcely make up my mind to believe that Roxburgh, Ainslie, Wight, Griffith, and Royle, could have failed to ascertain this, if there had been any specific difference.

The female flowers greatly predominate in the specimens under my observation. The anthers in the male flower are often less than five, but are fully charged with pollen.

Believe me, &c., &c.,

C. J. MULLER.

Pharmaceutical Journal, October, 1854.

THE MANUFACTURE OF LIQUOR AMMONIA.

By W. LAWSON.

The economical preparation of liquor ammoniæ has engaged the attention of manufacturing chemists for a considerable time, and seems to have attained its present state in consequence of the rapid spread of gas-lighting, considerable quantities of ammonia being obtained, as one of the bye-products in its manufacture; hence, in almost every town and village where gas is consumed, we find factories for the preparation of liquor ammoniæ. The principle on which ammonia is generated on the large scale does not differ materially from the process employed in laboratory experiments; viz. by introducing into a retort a mixture of an ammoniacal salt with hydrate of lime, and applying a gentle heat; in large factories, however, the salt is prepared in the same premises with the solution. The following process will be found to answer as well as any with which I am acquainted:—

Process.—Common gas liquor is introduced into a series of large stills, and gradually heated up to the boiling-point, when the ammonia is given off with steam, sulphuretted hydrogen, &c.; this impure mixture is conducted through a leaden worm surrounded by water, into a large leaden cistern or box, until a sufficient quantity has been collected for saturation with SO_3 , which combining with the NH_4O , forms sulphate of ammonia, and liberates large quantities of sulphuretted hydrogen; the mixture is ext pumped into leaden vats placed over the stills, and through

which the worm containing the impure solution of ammonia previously alluded to is conducted before it is brought into contact with cold water, and thus the hot vapor is made to concentrate the liquor already produced. After attaining a considerable degree of density, the liquid is drawn off into large leaden boilers set in fire bricks, and completely surrounded by a flue, where it is boiled down to such a density that on cooling it is found to become nearly a mass of salts. Four stills, capable of containing two hundred gallons each, may be readily worked off twice in twenty-four hours, and will yield about eight or ten cwt. of ordinary sulphate of ammonia, depending upon the strength of the gas liquor employed.

This rough sulphate of ammonia is next introduced into a still containing a quantity of milk of lime, and heat gently applied; a rapid evolution of gas soon takes place, which is conducted through upright iron pipes placed in a cool situation over the still, when the whole of the steam in combination with the gas becomes condensed, and falls back into the still, while the pure gas is conducted through leaden or gutta percha tubes into a set of glass carboys, arranged and connected like a series of Woulfe's bottles, about three parts filled with distilled water, into which a piece of glass tube connected with the delivery pipe just dips. Water possesses the power of absorbing this gas in a most extraordinary degree; at a temperature of 50° it is capable of condensing from 600 to 700 times its bulk; by this absorption the bulk of the solution becomes gradually increased, until, in the end, six parts of water become increased to ten, and the specific gravity of the liquid is reduced from 1.00 to 0.875. In applying heat to the still, it is necessary to be exceedingly careful in the first place not to apply it too strongly, otherwise the gas will be evolved so rapidly as to endanger the safety of the receivers by the liquid becoming too hot; and in the second, towards the latter end of the process, especially, to maintain a gradually increased heat, otherwise, a vacuum will be formed, and you will thus lose a large amount of your product. A still, containing about one cwt. of sulphate of ammonia will require about twenty four hours to work off, and will produce from sixty to seventy pounds of the strongest liquor ammoniac, having a sp. gr. of 0.875, and containing 32.5 per cent. of dry ammonia.—*Pharm. Jour.*, April, 1855.

MANUFACTURE OF CARBONATE OF MAGNESIA.

Native Carbonate of Magnesia.—Native carbonate of magnesia, or magnesite, has been found at Hrubschitz, district of Gromau, in Moravia; at Baudissero and Castellamonte, villages in the vicinity of Turin, Piedmont; in the East Indies; and in the district of Kironile, in the Eubæa. Specimens of the Piedmontese magnesite were exhibited under the name of Giobertite, in the Sardinian section of the Exhibition of 1851. It takes its name of Giobertite from Giobert, who established its true nature, it having passed for a long time for pure alumina. The magnesite from Baudissero contains 68 per cent of magnesia, and that of Castellamonte 26.3 per cent. The native carbonate from Moravia contains about 46 per cent. of magnesia. The analysis by Dr. Henry of a sample of native carbonate from a cargo imported by Mr. Babbington from India, also gave 46 per ct. of magnesia. It constitutes a range of low hills in Hindostan. In the Eubæa there are entire hills of it. The mines or quarries are situated in the villages of Limni, Kotsikir, and Matondi; the produce of the last named village is the best in quality. It is stated that upwards of 2000 tons are annually exported to Smyrna and England. The Eubæan magnesite contains 44 per cent. of magnesia. It is used for the manufacture of pure magnesia, and, as mentioned in our last number, Epsom salt. It is a very useful ingredient in the composition of bricks for refractory furnaces, on account of its property of resisting the heat of fire. Specimens of native carbonate of magnesia from Madras, and of Epsom salt manufactured therefrom, were shown in the exhibition of 1851; also specimens of magnesite from Eubæa.

In England, carbonate of magnesia is found in combination with carbonate of lime, forming what is called magnesian limestone or dolomite. The magnesian limestone extends from Newcastle to Nottingham. Annexed are the analyses of five specimens:

	1.	2.	3.	4.	5.
Carb. Lime	57.50	55.70	54.19	51.10	54.05
“ Magnesia	39.40	41.60	41.37	40.20	38.58
Silica	0.80	—	2.53	3.60	1.80
Oxide of Iron	0.70	0.40	0.30	1.80	1.36
“ “ Manganese	—	—	—	trace	1.50
Water and loss	1.60	2.30	1.61	3.30	2.71
	<hr/> 100.00	<hr/> 100.00	<hr/> 100.00	<hr/> 100.00	<hr/> 100.00

The preparation of carbonate of magnesia, the *Magnesia Alba* of P. L. 1787, was for several years a considerable secret in the possession of some particular persons. It formerly bore the name at Rome of Count Palma's powder. Many, however, are of opinion that the mode of preparation was carried from Germany to Italy. Lancisi, in 1717 (and, it is said, Valentini, in 1707), and afterwards Hoffman, in 1722, made public the process of manufacture. At that time it was extracted from the mother-liquor which remains after the crystallization of rough nitre (chloride of magnesium) by precipitation with a solution of carbonate of potash or soda. The name *Miraculum Chemicum* was given to it from the circumstance of a precipitate being formed by the admixture of two pellucid solutions.

Manufacture of Carbonate of Magnesia from Epsom Salt.—The manufacture of carbonate of magnesia from sulphate of magnesia, was first made known by Henry, of Manchester. The process communicated by him was as follows:—"Dissolve any quantity of sal catharticus amarus in its own weight of water; filter, and add to it by degrees a filtered solution of pearl or potashes, in an equal quantity of water, stirring them gently, until the mixed liquids have acquired the appearance of a complete coagulum. Then desist from adding any more of the alkaline lixivium, and immediately throw the mixture into a large vessel of boiling water; keep it boiling a quarter of an hour, then take it out and put it into glazed earthen vessels. As soon as the powder hath subsided, and before the water is quite cold, pour it off, and add a fresh quantity of boiling water; repeat these ablutions with hot water several times until the liquor has entirely lost its saline taste; then let it be so agitated as to suspend the finer parts of the powder, in which state decant it into other vessels, and having separated the water from the magnesia by inclination, put it on large chalk-stones, until a considerable part of the humidity is absorbed. Then wrap it up in sheets of white paper, and dry it before the fire. Pour hot water upon the remaining powder, stir and decant it in its turbid state, and separate the magnesia from the water as before; thus the whole, or most of it, will be reduced to an equal degree of fineness. The larger the quantity of water into which the precipitated powder is cast, the

more speedily and perfectly will the vitriolated tartar, which is formed by the union of the alkali with the acid of the sal catharticus, be washed off. The neutral salt should be washed off as quickly as possible, otherwise, by allowing the mixture to stand for some time the powder concretes with minute grains, which, when viewed with a microscope, appear to be assemblages of needles diverging from a point. These concretions cannot be redissolved by any washing, however long continued. Dr. Black orders four times the quantity of water to that of the solution for throwing the coagulum into; but Mr. Henry observes that this quantity is much too little. The water should be pure, and distilled water is the best. Hard or impure water makes magnesia coarse and disagreeable.

In the Pharmacopœias of the London and Edinburgh Colleges carbonate of soda is directed to be employed in the manufacture of carbonate of magnesia from sulphate of magnesia. The two *boiling hot* solutions are run together into large wooden vessels, while a workman keeps the whole in continued agitation for some time. The mixture is afterwards allowed to remain at rest for an hour or so, to permit the precipitated carbonate of magnesia to subside. When this deposit has taken place, the fine precipitate is repeatedly washed with pure water, to remove all traces of the sulphate of soda formed by the double decomposition of the two salts. The carbonate of magnesia is then allowed to drain, until it acquires sufficient consistency to be formed into small pieces of the shape of parallelopipedons, and then dried on wooden shelves in a stove at a low temperature.

On account of the great tendency of carbonic acid to form soluble bi-salts, it is necessary that the solutions of sulphate of magnesia and carbonate of soda should be mixed *boiling* in the manufacture of carbonate of magnesia. The magnesia alba, or carbonate of magnesia of commerce, is a *subcarbonate*, consisting of a combination of neutral carbonate of magnesia and hydrate of magnesia. The neutral carbonate is a crystallizable salt, which may be frequently observed depositing in the bottles containing solutions of the bicarbonate in Murray's fluid magnesia. This neutral carbonate is decomposed when put into water. If the water be cold it is decomposed into magnesia alba and bicarbonate; if the water be boiling it is resolved wholly into mag-

nesia alba or the subcarbonate; the excess of carbonic acid being expelled.

Heavy Carbonate of Magnesia.—Pereira gives the following as the method which he has seen followed in a large and esteemed manufactory:—Add one volume of a cold saturated solution of carbonate of soda to a boiling mixture of one volume of a saturated solution of sulphate of magnesia and three volumes of water. Boil until effervescence has ceased, constantly stirring with a spatula. Then dilute with boiling water, set aside, pour off the supernatant liquor, and wash the precipitate with hot water on a linen cloth. Afterwards dry it by heat in an iron pot.

Manufacture of Carbonate of Magnesia from Bittern.—In the manufacture of carbonate of magnesia from bittern, (chloride of magnesium), or the mother-liquor remaining after the extraction of common salt from sea-water, the crude carbonate of ammonia, obtained in the distillation of bones, or the ammoniacal liquor of gas-works, is used as the decomposing agent. In this case carbonate of magnesia is precipitated and muriate of ammonia obtained in solution. The after treatment is the same as that described above. Dolomite is also employed for the decomposition of bittern, in the same way as that of artificial chloride of magnesium. In this process the carbonate of lime of the dolomite becomes converted into chloride of calcium, leaving the carbonate of magnesia behind as an insoluble powder.

Manufacture of Carbonate of Magnesia from Dolomite.—In his patent of January 23d, Dr. Richardson claims the manufacturing of magnesia and carbonate of magnesia from magnesian limestone by the employment of muriatic acid. The quantity of the acid used should be slightly in excess of the exact quantity required to dissolve out the lime in the limestone operated upon. This may be either burnt to expel the carbonic acid and then slaked in pits previous to adding the muriatic acid, or it may be employed in the natural state, reduced to an impalpable powder, the product in the former case being magnesia, and in the latter an impure carbonate, which may either be employed as such, or be deprived of its carbonic acid by the application of heat. The acid preferred for this purpose is the weak muriatic acid, which is at present allowed to run to waste in alkali works, and the pro-

portion of it used is a quantity containing about thirty-seven parts of pure hydrochloric acid to every twenty-eight parts of lime in the calcined magnesian limestone, and the same for every fifty parts of carbonate of lime in the uncalcined stone.

The magnesia or carbonate of magnesia thus obtained, Dr. Richardson employs in the magnesian salts, as noticed in the article on "Epsom Salt," in the last number of the *Pharmaceutical Journal*. He also manufactures carbonate of magnesia by causing a stream of carbonic acid to be forced through vessels containing magnesia obtained as before mentioned, diffused through water. A bicarbonate is thus produced, which enters into solution with the water, and this is subsequently converted into carbonate, which is obtained as a precipitate by the application of a gentle heat to the vessel containing the solution of bicarbonate.

The best process for the manufacture of carbonate of magnesia is, undoubtedly, that patented by Mr. H. L. Pattinson, Sept. 24th, 1841. The process is as follows:—Magnesian limestone, as rich as possible in magnesia, is reduced to powder, and sifted through a sieve of forty or fifty meshes to the linear inch. It is then heated red-hot in an iron retort or reverberatory furnace for two or three hours, when, the carbonic acid being expelled from the carbonate of magnesia, and not from the carbonate of lime, the whole is withdrawn from the retort or furnace and allowed to cool. The magnesia contained in the limestone is now soluble in water impregnated with carbonic acid gas, and to effect this solution Mr. Pattinson proceeds as follows:—An iron cylinder lined with lead, of any convenient size, say four feet long by two feet and a half in diameter, is provided, furnished with a safety valve and agitator, which latter may be an axis in the centre of the cylinder, with arms reaching nearly to the circumference—all made of iron and covered with lead. This cylinder is placed horizontally, and one extremity of this axis is supported within it by a proper carriage, the other extremity being prolonged, and passing through a stuffing-box at the other end of the cylinder, so that the agitator may be turned round by applying manual or other power to its projecting end. A pipe leading from a force-pump is connected with the under side of the cylinder, through which carbonic acid gas may be forced

from a gasometer in communication with the pump, and a mercurial guage is attached to show at all times the amount of pressure within the cylinder, independently of the safety-valve. Into this cylinder, so fitted up as described, from 100 to 120 lbs. of the calcined limestone is introduced, with a quantity of pure water nearly filling the cylinder; carbonic acid gas is next pumped in, the agitator being constantly turned the while, and more and more gas forced in until absorption ceases under a pressure of five atmospheres. The whole is allowed to remain in this condition for three or four hours, and the contents of the cylinder are then run off into a cistern and allowed to settle. The clear liquor is now a solution of carbonate of magnesia in water, impregnated with carbonic acid gas, or a solution of bicarbonate of magnesia having a sp. gr. of about 1028, and containing about 1600 grains of carbonate of magnesia to the imperial gallon.

Mr. Pattinson considers the best mode of obtaining a solution of bicarbonate of magnesia from magnesian limestone, is to operate upon the limestone after being calcined at a white heat in the way described, but the process may be varied by using in the cylinder the mixed hydrates of lime and magnesia, obtained by completely burning magnesian limestone in a kiln, as commonly practised, and slaking it with water in the usual manner; or, to lessen the expenditure of carbonic acid gas, the mixed hydrates may be exposed to the air for a few weeks, until the lime has become less caustic by the absorption of carbonic acid from the atmosphere, or the mixed hydrates may be treated with water, as practised by some manufacturers of Epsom salt, until the lime is wholly or principally removed, after which the residual rough hydrate of magnesia may be prepared for solution in the cylinder by dissolving magnesian limestone in hydrochloric acid, and treating the solution, or a solution of chloride of magnesium, obtained from sea-water by salt-makers in the form of bittern, with its equivalent quantity of hydrate of lime, or of the mixed hydrates of lime and magnesia obtained by completely burning magnesian limestone and slaking it as above. Mr. Pattinson states that, when he uses this solution of bicarbonate of magnesia for the purpose of preparing carbonate of magnesia, he evaporates the solution to dryness, by which he at once obtains a pure carbonate of magnesia, without the necessity

of using a carbonated alkali, as in the old process; and from this he prepares pure calcined magnesia by calcination in the usual manner, or, instead of boiling the solution to dryness he merely heats it for some time to the boiling point, by which excess of carbonic acid is partly driven off, and pure carbonate of magnesia precipitated, which is collected and dried in the usual way.

Manufacture of Carbonate of Magnesia from Magnesite.—

Dr. Richardson's more recent improvements in the manufacture of carbonate of magnesia, are contained in the specification of his patent, dated June 14th, 1853. He takes any impure hydrate, or carbonate of magnesia, free from lime, or nearly so, such, for instance, as *magnesite*, (the impure hydrate of magnesia, which is a waste product in Ward's process of carburating soda ash, being preferred) and diffuses it through water, so as to form a cream or milk-like fluid, which he runs into a large soda-water machine, wherein he pumps carbonic acid, in the same manner as when making soda-water. Or, he partially fills a wooden box, divided into cells by partitions running from the top and bottom alternately, with this milk-like fluid, and by means of a steam-jet, or air-pump worked by suitable machinery, he draws a stream of carbonic acid through a whole series of compartments from a furnace filled with coke or charcoal. When the liquid becomes saturated with bicarbonate of magnesia, or stands at 5° to 11° on Twaddell's hydrometer (sp. gr. 1.025 to 1.055), it is drawn off, and after standing about an hour a small quantity of a cream of magnesite is gradually added, which he finds carries down all the oxide of iron and other impurities, leaving a clear pure solution of bicarbonate of magnesia. This solution is heated to expel the excess of carbonate precipitates, and is collected and treated in the usual way, or a quantity of pure magnesia in suspension in water is added until the whole is precipitated as carbonate of magnesia.

The furnace employed for producing carbonic acid is filled with coke or charcoal, and is supplied with air through an opening at the bottom, and another higher up, on a level with the top of the fuel. The air may be drawn through by means of a jet of steam or otherwise, or forced forwards by a blowing cylinder or fan-blast, so regulated by valves or dampers, that the supply of

air entering at the upper opening shall be a little more than sufficient to convert all the carbonic oxide into carbonic acid, so as to economise the fuel and render the action of the gas more energetic on the milk of magnesia. Carbonic acid obtained from any other source equally answers the purpose.—*London Pharm. Journ.*, November 1854.

Varieties.

On Perfumery. By SEPTIMUS PIESSE.

(Continued from page 278.)

The thirteen previous articles which have appeared in the "Annals" have exclusively treated of Wet Perfumes, the present matter relates to Dry Perfumes; sachet powders, tablets, pastilles, fumigation by the aid of heat of volatile odorous resins, &c., &c. The perfumes used by the ancients were, undoubtedly, nothing more than the odoriferous gums which naturally exude from various trees and shrubs indigenous to the Eastern hemisphere—that they were very extensively used and much valued, we have only to read the Scriptures for proofs:—"Who is this that cometh . . . perfumed with myrrh and frankincense, with all the powders of the merchant?" (Song of Solomon iii. 6.) Abstaining from the use of perfume in Eastern countries is considered as a sign of humiliation:—"The Lord will take away the tablets, and it shall come to pass that instead of a sweet smell there shall be a stink."—(Exod. xxxv. 22; Isaiah iii. 20, 24.) The word tablets in this passage means perfume boxes, curiously inlaid, made of metal, wood, and ivory. Some of these boxes may have been made in the shape of buildings, which would interpret the word *palaces* in Psalm xiv. 8:—"All thy garments smell of myrrh, and aloes, and cassia, out of the ivory palaces, whereby they have made thee glad." From what is said in Matt. ii. 11, it would appear that perfumes were considered among the most valuable gifts which man could bestow:—"And when they (the wise men) had opened their treasures, they presented unto him (Christ) gifts; gold, and frankincense, and myrrh." As far as we are able to learn, all the perfumes used by the Egyptians and Persians during the early period of the world were *dry* perfumes, consisting of spikenard (*Nardostachys jatamansi*), myrrh, olibanum, and other gum resins, nearly all of which are still in use by the manufacturers of odors. Among the curiosities shown at Alnwick Castle is a vase that was taken from an Egyptian catacomb. It is full of a mixture of gum resins, &c., which evolve a pleasant odor to the present day, although probably 3,000 years old. We have no doubt that the original use of this vase and its contents were for perfuming apartments, in the same way that pot pourri is now used.

SACHET POWDERS.

The French and English perfumers concoct a great variety of these substances, which being put into silk bags, or ornamental envelopes, find a ready sale, being both good to smell, and economical as a means of imparting an agreeable odor to linen and clothes as they lie in drawers. The following formula shows their composition. Every material is either to be ground in a mill, or powdered in a mortar, and afterwards sifted.

SACHET AU CHYPRE.

Ground rose wood	1 lb.	Ground santal wood	1 lb.
" cedar wood	1 lb.	Otto of rhodium, or otto of rose 3 drms.	

Mix and sift, it is then fit for sale.

SACHET A LA FRINGIPANNE.

Orris root powder	3 lbs.	Otto of neroly	} of each . 1 drachm.
Vitiver powder	$\frac{1}{2}$ lb.	" rose	
Santal wood powder	$\frac{1}{2}$ lb.	" santal	
Musk pods, ground	1 oz.		

The name of this sachet has been handed down to us as being derived from a Roman of the noble family of Frangipani. Mutio Frangipani was an alchemist, evidently of some repute, as we have another article called rosolis, or ros-solis, *sun-dew*, an aromatic spirituous liquor, used as a stomachic, of which he is said to be the inventor, composed of wine, in which is steeped coriander, fennel, anise, and musk.

HELIOTROPE SACHET.

Powdered orris	2 lbs.	Vanilla beans	$\frac{1}{2}$ lb.
Rose leaves, ground	1 lb.	Grain musk	$\frac{1}{2}$ oz.
Tonquin beans, ground	$\frac{1}{2}$ lb.	Otto of almonds	5 drops.

Well mixed by sifting in a coarse sieve, it is fit for sale.

It is one of the best sachets made, and is so perfectly *au naturel* in its odor to the flower from which it derives its name, that no person unacquainted with its composition would, for an instant, believe it to be any other than the "real thing."

LAVENDER SACHET.

Lavender flowers, ground	1 lb.	Otto of lavender	$\frac{1}{2}$ oz.
Gum benzoin, in powder	$\frac{1}{2}$ lb.		

SACHET A LA MARECHALE.

Powder of santal wood	$\frac{1}{2}$ lb.	Cloves, ground	$\frac{1}{2}$ lb.
" orris root	$\frac{1}{2}$ lb.	Cassia bark	$\frac{1}{2}$ lb.
Rose leaves, ground	$\frac{1}{2}$ lb.	Grain musk	$\frac{1}{2}$ drachm.

SACHET A LA MOUSSELAINE.

Vitiver, in powder	1 lb.	Benzoin, in powder	$\frac{1}{2}$ lb.
Santal wood	} each	Otto of thyme	5 drops.
Orris		" roses	$\frac{1}{2}$ drachm.
Black currant leaves (<i>casse</i>)	$\frac{1}{2}$ lb.		

MILLEFLEUR SACHET.

Lavender flowers, ground	} each 1 lb.	Tonquin	} each	$\frac{1}{2}$ lb.
Orris		Vanilla		
Rose leaves		Santal		
Benzoin		Musk and civet	each	2 drachms.
Cinnamon		Cloves, ground	$\frac{1}{2}$ lb.	
Allspice	each	2 oz.		

PORTUGAL SACHET.

Dried orange peel	1 lb.	Otto of orange peel	1 oz.
" lemon peel	$\frac{1}{2}$ lb.	" neroly	$\frac{1}{2}$ drachm.
" orris root	$\frac{1}{2}$ lb.	" lemon grass	$\frac{1}{2}$ drachm.

PATCHOULY SACHET.

Patchouly herb, ground	1 lb.	Otto of patchouly	$\frac{1}{2}$ drachm.
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Patchouly herb is often sold in its natural state, as imported, tied up in bundles of half-a-pound each.

POT POURRI.

This is a mixture of dried flowers and spices *not* ground.

Dried lavender	1 lb.	Broken cloves	} each 2 oz.
Whole rose leaves	1 lb.	" cinnamon	
Crushed orris (coarse)	$\frac{1}{2}$ lb.	" allspice	
Table salt	1 lb.		

We need scarcely observe that the salt is only used to increase the bulk and weight of the product in order to sell it cheap.

OLLA PODRIDA.

This is a similar preparation to pot pourri. No regular form can be given for it, as it is generally made, or "knocked-up," with the refuse and spent materials derived from other processes in the manufacture of perfumery, such as the spent vanilla after the manufacture of tincture or extract of vanilla, or of the grain musk from the extract of musk, orris from the tincture, tonquin beans, after tincturation, &c., &c., mixed up with rose leaves, lavender, or any odoriferous herbs.

ROSE SACHET.

Rose heels	1 lb.	Otto of roses	$\frac{1}{2}$ oz.
Santal wood, ground	$\frac{1}{2}$ lb.		

SANTAL WOOD SACHET.

This is a good and economical sachet, and simply consists of the ground wood. Santal wood is to be purchased from some of the wholesale drysalters; the drug-grinders are the people to reduce it to powder for you—any attempt to do so at home will be found unavailable, on account of its toughness.

SACHET (*without a name*).

Dried thyme	} of each $\frac{1}{2}$ lb.	Dried rose heels	1 lb.
" lemon thyme		Ground cloves	2 oz.
" mint		Allspice	2 oz.
" marjoram		Musk in grain	1 drachm.
" lavender	$\frac{1}{2}$ lb.		

VERVAINE SACHET.

Lemon peel, dried and ground	1 lb.	Otto of lemon peel	$\frac{1}{2}$ oz.
Lemon thyme	$\frac{1}{2}$ lb.	" bergamot	1 oz.
Otto of lemon grass	1 drachm.		

VITIVERT SACHET.

The fibrous roots of the *Anthoxanthum muricatus* being ground, constitutes the sachet, bearing the name as above, derived from the Tamool name, *vittie vayer*, and by the Parisian *vetiver*. Its odor resembles myrrh. Viti-

vert is more often sold tied up in bunches, as imported from India, than ground, and is used for the prevention of moth, rather than as a perfume.

VIOLET SACHET.

Black currant leaves (<i>Casse</i>)	1 lb.	Grain musk	1 drachm.
Rose heels or leaves	. . . 1 lb.	Tonquin beans	$\frac{1}{2}$ lb.
Orris root powder	. . . 2 lbs.	Gum benzoin, in powder	$\frac{1}{2}$ lb.
Otto of almonds			$\frac{1}{2}$ drachm.

Well mix the ingredients by sifting; keep them together for a week in a glass or porcelain jar before offering for sale.

There are many other sachets manufactured besides those already given, but for actual trade purposes there is no advantage in keeping a greater variety than those named. There are, however, many other substances used in a similar way; the most popular is the

PEAU D'ESPAGNE.

Peau d'Espagne, or Spanish skin, is nothing more than highly perfumed leather. Good sound pieces of wash leather are to be steeped in a mixture of ottoes, in which are dissolved some odoriferous gum resins, thus:—Otto of neroli, otto of rose, santal, of each half an ounce; otto of lavender, verbenas, bergamot, of each a quarter of an ounce; otto of cloves and cinnamon, of each two drachms; with any others thought fit. In this mixture dissolve about two ounces of gum benzoin; now place the skin to steep in it for a day or so, then hang it over a line to dry. A paste is now to be made by rubbing in a mortar one drachm of civet with one drachm of grain musk, and enough solution of gum acacia or gum tragantha to give it a spreading consistence; a little of any of the ottoes that may be left from the steep stirred in with the civet, &c., greatly assists in making the whole of an equal body; the skin being cut up into pieces of about four inches square are then to be spread over, plaster fashion, with the last named compost; two pieces being put together, having the civet plaster inside them, are then to be placed between sheets of paper, weighed or pressed, and left to dry thus for a week; finally, each double skin, now called peau d'Espagne, is to be enveloped in some pretty silk or satin, and finished off to the taste of the vender.

Skin or leather thus prepared evolves a pleasant odor for years, and hence they are frequently called "the inexhaustible sachet." Being flat they are much used for perfuming writing-paper.—*Annals of Pharmacy.*

Note on a New method of Biting for Heliographic Engraving upon Steel.
By NIEPCE DE SAINT-VICTOR.—The author has been engaged in researches with a view to obtain a substitute for nitric acid in heliographic engraving upon steel. The fumigations indicated by him often give too much or too little resistance to the varnish, so that it was necessary to find some mordant which would act upon the metal without attacking the varnish.

For this purpose he has found nothing better than water saturated with

iodine at a temperature of 50°–59° F. at the outside, so that it may have a golden-yellow color with no trace of reddish-orange.

The biting is commenced by covering the plate with iodized water, which is renewed in ten minutes or a quarter of an hour; a part has then combined with the steel to form iodide of iron, and the other is volatilized, so that it is important to change the iodized water two or three times, that is to say, until the plate is considered to be sufficiently bitten.

The biting takes place slowly, and is never deep enough, unless the operation is completed by water slightly acidulated with nitric acid; it has then sufficient action to eat into the metal to a greater depth than the iodine, without, however, attacking the ground. The application of this method has given excellent results.—*London Chem. Gaz. from Comptes Rendus*, March 12, 1855, p. 584.

Upon some Oils of the Dolphin and Phocenic Acid.—By M. BERTHELOT. —Since the discovery of valerianic acid, it has been supposed that the volatile oils of the fat of the dolphin, to which Chevreul first gave the name of phocenic acid, is valerianic acid. Probable as this identity appeared, however, it was doubted by some chemists. But Heintz's work upon the fats must especially be regarded as contradicting this identity, as Heintz found that the neutral fats of the animal kingdom only contained numbers of atoms of carbon divisible by four. Berthelot has therefore examined the fat of several dolphins, and amongst others that of *Delphinus Marginatus*, Cuv., and also that of some sharks, such as *Mustellus vulgaris*, Cuv., and *Scymnus ni-censis*, Cuv., and always found that the volatile acid was valerianic acid. To ascertain the presence of volatile acids in fat, Berthelot distils, at a gentle heat 100 grms. of the fat with 100 grms. of a mixture of alcohol and sulphuric acid. If the first portion of the distillate be mixed with water, the ethers of the volatile acids separate.

The author afterwards prepared valerianic acid in the ordinary manner, and analysed it and its ether. The results obtained were distinctly in favor of the identity of the so-called phocenic acid with valerianic acid.—*Ibid*, from *Journ. de Pharm et de Chim.*, 3 ser., xxvii. p 35.

Tasteless Infusion of Senna.—Dr. Brandeis recommends a cold infusion of senna for twelve hours in a covered vessel, as especially useful in infantile therapeutics. By this modification of the process usually employed, the water contains only the cathartic and the coloring matter, leaving the essential oil, the fatty matter, and the irritating resin, which are only soluble in hot water. Senna water thus prepared cold, is almost insipid, and its taste completely disappears when mixed with infusion of coffee or tea.—*Boston Med. and Surg. Journ. from Archives Generales de Med. for April*.

Limits of the vaporization of Mercury.—Till now it has been admitted with Faraday that the vaporization of mercury is very limited; that at 20°

C. the mercurial vapor may reach a height of one decimeter, and at a lower temperature to 0° C., it does not exceed two centimeters. Faraday employed in his experiments a plate of gold placed at the requisite height. M. Brame, Professor of Chemistry at Tours, has found on his trials, that the vapor passes much beyond these limits. He used a reagent more sensitive than gold, viz., sulphur deposited in a vesicular state on a plate of glass, which becomes brown under the influence of mercurial vapor. In the vaults of the Paris Observatory where the temperature is uniform, this reaction took place at a height of 1.20 metres in the space of twenty days; and by prolonging the experiment he was enabled to condense on the surface a considerable quantity of mercury. It was the same with mercurial ointment, silver amalgam, tin amalgam, &c. From these experiments and others tending towards the same end, M. Brame concludes that the vapor of mercury is subjected to the ordinary law for the mixture of gases and vapors.—*Siliman's Journal*, May, 1855.

Anesthesia of Bees.—Apiculturists often find it desirable to stupify bees, when, for instance, there are two feeble swarms and it is best to kill the queen of one. In Brittany, as well as in Alsace, the smoke of a common puff ball, *Lycoperdon cryptus Lupi*, has been employed from time immemorial. In the Dict. d'Hist. Nat. of D'Orbigny, it is reported that in Southern Russia the *Lycoperdon horrendum* and the *Endoneuron suberosum* are used to intoxicate the bees in order to get their honey. Dr. de Beauvoys has taken up this subject, and has found that the best species for the purpose is the *Lycoperdon giganteum*. In using it, a piece of the *Lycoperdon* is put on burning charcoal contained in a chafing dish and covered with a funnel of stoneware, and the smoke is directed from it into the suspended hive: a cloth laid on the ground receives the bees as they fall. The experiments have been repeated before the Zoological Society, in which the stupefaction of the bees continued for half an hour.—*Ibid.*

Pisciculture.—This important subject has occupied much the Society of Acclimation. A method has now been ascertained by which we may know the maturity of the eggs of certain fishes, a method which has been arrived at through the researches of MM. Valenciennes and Frémy on the eggs of osseous fishes. These investigators have found that the eggs, while adhering to the ovarian lamellæ, give with water an abundant precipitate of a substance named by them *Ichtuline*; while the mature egg affords no *ichtuline*: whence the eggs of certain fishes are ready for fecundation when they give no precipitate with distilled water. In this trial with the Cyprinoids, for example, an egg is taken and broken upon a plate of glass, and a drop of pure water added: if the liquid is not clear the egg is not mature.—*Ibid.*

Production of Alcohol.—The question bearing on the cheap production of alcohol has not made much progress since my last communication. New

projects and new processes have been sent to the *Société d'Encouragement* without appearing to resolve the problem. Asphodel, in this connection, may look forward to a fine future. According to Dumas, the quantity of bulbs of asphodel in Algeria is enormous, they cover a space 20 leagues square, and are so crowded that clearing them out is a great labor.

General Vaillant, who commands one of the military divisions in French Algeria, states that the pulp proceeding from the extraction of the alcohol from asphodel may be used as food for hogs, who eat it without hesitation and with advantage. In the month of May, June, July, and August, the proportion of the fermentable principle reaches even 12 p. c., nearly the maximum of that of cane sugar, and almost double that of beet sugar.

M. Dumas also calls attention to another plant more abundant still in Algeria, the *Scilla maritima*, whose large and dry bulbs are so crowded in the soil that no space is left between. According to M. Fée, Professor of Botany in the Faculty of Medicine of Strasburg, the *Scilla* affords more than 30 p. c. of saccharine matter. It is however important to remark that it contains also a bitter principle which may injure the alcohol.—*Ibid.*

On Bitumen Springs of California.—It is an interesting fact, which I believe is not generally known, that there are numerous places in the Coast Mountains, south of San Francisco, where *bitumen* exudes from the ground, and spreads in great quantity over the surface. These places are known as *Tar Springs*, and are most numerous in the vicinity of Los Angeles. It is also common to meet with large quantities of this material floating on the Pacific, west of Los Angeles, and northward towards Point Conception. I have seen it, when, passing this point, floating about in large black sheets and masses. They are probably the product of submarine springs; or they may be floated down by small streams from the interior.*

Some of the springs that I examined near Los Angeles were nothing more than overflows of bitumen or asphalt from a small aperture, around which it had spread out so as to cover a circular space of about thirty feet in diameter. This had hardened by exposure, and was covered and mingled with dust and sand, which quickly adheres to its clean and fluid surface. The outer portions were hard as a pavement; and the mass was highest towards the centre, where it was soft and fluid, like melted pitch. It was thus evident that all the hard portions had risen in a fluid state, and by the heat of the sun had been gradually spread out over the surface. Being constantly exposed to the dust, it had become so thoroughly incorporated with the asphalt that the compound had all the consistency of an artificial admixture.

* I am informed by Lieutenant W. P. Trowbridge, of the United States Engineer Corps, that the channel between Santa Barbara and the Islands is sometimes covered with a film of mineral oil, giving to the surface the beautiful prismatic hues that are produced when oil is poured on water.

The spring that I have described is one of several similar ones, on the bank of a small brook about seven miles from Los Angeles.

I passed up and down the stream just mentioned for a short distance, on each side, and found one or two natural exposures of the edges of nearly horizontal shales of a light color, and very thinly stratified. The lowest layers were charged with *bitumen*, and were of various shades of brown and black.

These shales were principally siliceous, and were overlaid by a stratum of pebbles and sand, probably beach-shingle.

Bituminous shales are also exposed in the harbor of San Pedro, near the base of the vertical bluffs of sedimentary formations along the beach. They have a dark brown or black color, and appear to be argillaceous. They emit a strong bituminous odor when struck by the hammer.—*Silliman's Journal*, W. P. Blake, in *Williamson's Report of Pacific Survey*.

NOTICE.

TO THE PHARMACEUTISTS AND DRUGGISTS OF THE UNITED STATES.

AMERICAN PHARMACEUTICAL ASSOCIATION.

The 3rd Section, First Article, of the Constitution requires the President, at least three months previous to the annual meeting, to publish a call, in all the Pharmaceutical, and in such other Medical Journals as he may select, stating therein the objects of the Association and the conditions of the Membership. In compliance with this duty, you are hereby notified, that the next annual meeting of the Association will be held in the City of New York, on the second Tuesday (11th) of September, 1855, at 3 o'clock, P.M.

The objects of the Association are, to deliberate on the condition of our profession, the advancement of Pharmaceutical knowledge, and the elevation of the professional character of Apothecaries and Druggists throughout the United States.

CONDITION OF MEMBERSHIP.

Section II.—ARTICLE I. All pharmacutists and druggists who shall have attained the age of twenty one years, whose character, morally and professionally, is fair, and who, after duly considering the obligations of the Constitution and Code of Ethics of this Association, are willing to subscribe to them, shall be eligible for membership.

ARTICLE II. The members shall consist of delegates from regularly constituted Colleges of Pharmacy and Pharmaceutical Societies, who shall present properly authorized credentials, and of other reputable Pharmacutists feeling an interest in the objects of the Association, who may not be so delegated, the latter being required to present a certificate signed by a majority of the delegates from the places whence they come. If no such dele-

gates are present at the Association, they may, on obtaining the certificates of any three members of the Association, be admitted, provided they be introduced by the Committee on Credentials.*

ARTICLE IV. Every member shall pay into the hands of the Treasurer the sum of two dollars as his yearly contribution.

ARTICLE V. Every local Pharmaceutical Association shall be entitled to five delegates.

W. B. CHAPMAN, President.

Cincinnati, April 11, 1855.

[* *Note by the Editor*.—The wording of the second article of the constitution has been understood by many in an exclusive sense. It should be distinctly understood that all reputable Pharmacutists and druggists, who are favorable to the objects of the Association, will be welcomed at the meeting.]

Editorial Department.

AMERICAN PHARMACEUTICAL ASSOCIATION ; MEETING OF 1855.—It is greatly to be desired that the approaching meeting of the Association will be the commencement of a new era in its history, marked by a greater manifestation of interest on the part of the pharmacutists of the United States, and especially by those located in and near New York City, the place of meeting. The most numerous body of pharmacutists in the United States, with the largest drug mart within their borders, much is justly to be expected from them in the furtherance of this excellent enterprize, which, as it originated in their city, they should feel a pride in promoting. The subscription, which is but two dollars annually, is no impediment to membership to even the least wealthy members of the pharmaceutical body. It is to be hoped that scientific subjects will occupy more of the attention of the meeting than usual, that the Transactions may possess a permanent interest. Heretofore the Proceedings have been published in Philadelphia. It is right that other places should take part in this branch of the operations, and we hope that our New York friends will claim it for the coming occasion. Our readers will find the official announcement at page 378.

PURE OR DEODORIZED ALCOHOL.—It is an important item in the economy of the pharmaceutical laboratory, to possess a supply of pure alcohol fit for the nicer preparations, and for such perfumery as is usually prepared by the apothecary, as cologne, lavender, Florida, and other so-called "waters." The Messrs. Atwood, of Waltham, having patented a process for purifying alcohol from fusel oil and other odorous impurities, in which manganic acid is employed, have gradually been extending the "right" to manufacture it. At pages 6 and 7 of our advertising sheet it will be seen that

Mr. Heard, of Boston, has purchased the right for New York and New England, and Messrs. Z. Locke & Co. the right for Pennsylvania and Camden, New Jersey. The latter firm, well known in this city, are now prepared to furnish this alcohol to all druggists, apothecaries, and perfumers. We have found it very pure.

FLUID EXTRACTS PREPARED IN VACUO.—We have just received from the Messrs. Tilden, of New Lebanon, New York, twenty-one samples of Fluid Extracts, as enumerated in their advertisement, to which they invite our attention. We can only acknowledge their reception, deferring any critical remarks in regard to them until our next.

NEW WORK ON PRACTICAL PHARMACY.—The attention of our readers is directed to the advertisement of Messrs. Blanchard & Lea on the next sheet, wherein it will be seen that they are about to publish a work on practical pharmacy, by Edward Parrish. This work, though more especially intended for medical men, is, we are informed, sufficiently wide in its scope to embrace much useful practical information for the apothecary, especially in reference to extemporaneous pharmacy.

HONOR TO THE DESERVING.—By an Imperial decree, dated the 13th of March, at the suggestion of the Minister of Public Instruction and Worship, the grade of officer in the Legion of Honor was conferred on M. Deville, (St. Claire) Professor of Chemistry in the Superior Normal School, who, by his discovery of the mode of producing aluminium in large masses, has conferred on manufacturing art the use of this valuable metal.

And also upon M. Woehler as the discoverer of aluminium, and as the first who made an organic animal substance, urea, altogether from mineral elements.

Memoirs of the Life and Scientific Researches of John Dalton, F. R. S.
By WILLIAM CHARLES HENRY, M. D., F. R. S., &c. London. Printed by the Cavendish Society. 1854. pp. 248, octavo.

The eminent services of Dalton to the science of chemistry renders the publication of his memoirs by the Cavendish Society particularly appropriate; and in Dr. Henry, the philosopher has a biographer every way qualified to do him justice. Born of Quaker parents at Eaglesfield in Cumberland, on the 15th of September, 1776, he derived his instruction at the village school until his eleventh year, soon after which he commenced the life of a tutor, and this continued to be his profession throughout his long career. In his fifteenth year he assisted his brother at Kendal, and continued for twelve years. During this period he commenced his meteorological observations, which afterwards led him to discoveries, in that science, of considerable importance. Subsequently his attention was turned to reflect on the ultimate constitution of matter, and he gave his leisure to chemical pur-

suits, and it was during the fifteen years following his departure from Kendal, (1793 to 1808) that his doctrine of the Atomic Theory, and his discovery of the law of multiple proportions were developed and introduced to the scientific world. The further development of these was the great work of his life, as they are the basis on which his fame as a philosopher chiefly rests.

Dalton's mental contour was the embodiment of patient, earnest, constantly operating thought. A subject once brought within his mental laboratory underwent a process of intellectual digestion until he had extracted from it all that his powers would admit. There was no hurry or confusion, no fear of being anticipated, but a steady contemplation of it in all the lights suggested to him by reflection. Dalton's *forte* was not in the exactitude of his experiments, so much as in his ability to draw inferences and make generalizations from the data they furnished. As an experimenter he was, as his biographer admits, by no means exact, having instruments faulty in construction, and incapable, even in more expert hands, of yielding reliable results; yet in spite of his defects as a manipulator, he was enabled, by his superior deductive powers, to make discoveries which have changed the whole aspect of chemical science. It was fortunate for Dalton's reputation as a discoverer that he was more given to reflecting on his own experiments than to looking after the researches of others, else he might have figured more as the developer of Richter's views than the advocate of his own. Seconded by such men as Thompson, Wollaston and Berzelius, Dalton's doctrine of multiple proportions in combination soon triumphed over the opposition which at first it met with; while his atomic theory, that which he evidently considered his greatest achievement, is becoming more and more probable in the progress of chemical science, although its very nature seems to place it beyond the possibility of direct demonstration. Had Dalton possessed the acuteness of Wollaston as a manipulator, and the accuracy of Berzelius as an analyst, he would have concentrated them with an untiring perseverance on the development of his views, and perhaps have extended yet further the bounds of chemical philosophy. We cannot do better for our readers than quote the following paragraphs from an essay on Dalton, by Mr. Joseph Ince, in the *Pharmaceutical Journal*:—

"But a little while ago, Manchester, in the midst of its roar of business, beheld a goodly spectacle of beautiful old age. A guileless citizen, with not one stray thought beyond Philosophy, was calmly working out his abstract reasonings, heedless of tall factories or sudden wealth. His home was in the laboratory, where he repaired every morning to light the fires and dust the pupils' desks; then, after a frugal breakfast, back again, ready and willing to commence his daily lectures. The spirit of worldly policy was not strong within him, for his instructions were given for the moderate sum of half a crown an hour, or eighteenpence when two attended. There sometimes he would busy himself in manufacturing an unfailing remedy for coughs and colds made with treacle, liquorice, and vinegar, explaining its sovereign virtues to an admiring audience.

No one could be more said to keep the even tenor of his way, for he dined at one, took tea at five, finishing the labors of the day at nine. This patriarchal existence was varied every Thursday by a game at bowls, which he pursued with an amusing ardor; but the main characteristic of the man was that transparent honesty, which made him as scrupulously exacting in his requirements from others as he was upright in his own conduct towards them. Thus he refused a certificate of attendance, until he had repeated in full the missing lecture for the applicant's sole advantage. Such traits of character, as well as his curious aversion to books and general literature, belong to the pleasant recollections of the past. Let us not, however led away by the prettiness of circumstance, for a moment lose sight of Dalton's real claim to honor, namely, his discoveries in science. A popular sketch necessarily shuts out the exhibition of those careful, minute, deeply-studied investigations, to which all original philosophers owe their reputation.

Those who wish to penetrate a little beneath the surface, cannot do better than consult the concise, intelligible Essay on the Atomic Theory, by Dr. Henry, given in the middle of the work. As Dalton's claim to priority of thought has been occasionally denied, it is well to see what were the views entertained on the subject previous to his time, how far he availed himself of the anticipations of others, and to what extent he may be credited with working out for himself the great doctrine on which his life was engaged.

Time was more favorable to Dalton than to another great mathematician—Hutton—who has recorded his opinion in his autobiography that it produces nothing but rags and children. The quiet Friend fared better in his generation; the Royal Society elected him a fellow, Oxford gave him her honors, Chantrey a statue, and the Government a pension, whilst his countrymen regarded him, even in his lifetime, as a sort of patron saint.

Now that the grave has claimed him he may rest in peace, without the fear of his reputation being snatched away by the spell of the euphonious name of Higgins.

A man who spent the energies of a whole career on the elucidation of one sole object could not be said to have *blundered* on the atomic theory, any more than the enthusiast who should walk on a pilgrimage from here to Manchester could be said to stumble on the high-road.

Self-taught, Dalton succeeded in spite of himself, for his philosophical instruments were of the rudest description, and his hands were not equal to his head; but for original, deep thought, united to a child-like simplicity, he will not soon be forgotten.

Dalton, like Sir Isaac Newton, (to whom he bore a strong mental and personal resemblance), disbelieved in genius, a misconception incident to real greatness, but one most readily pardoned in the case of those whose life is the best refutation of the theory. It is true indeed, that the marvellous influence of steady perseverance can be alone estimated by those who practice it, yet still there is a barrier which nothing but directing and creative power can pass.

Untiring industry will rescue the dullest mind from mediocrity; but there is an Excelsior which it cannot reach. Many a mountain shepherd has watched the changes of the atmosphere far more than Dalton, but unlike him, in vain; whilst many another inconsequent observer might have viewed the falling of an apple from the first one that tempted Eve, and been no wiser."

A report to the New York Academy of Medicine, on Solidified Milk, by the Standing Committee on Public Health and Legal Medicine. New York, 1855.

We have already given a brief account of the establishment of Mr. S. T. Blatchford, (see page 112) from the New York Med. Monthly, to which we refer our readers. The above report, by Prof. Griscom, Dr. Van Kleeck, and others, is entirely favorable to the success of the enterprize. The report says:

"Your committee have perhaps said all that is necessary to satisfy the Academy that the article before us is not only available as a *substitute* for milk, but that it is in fact *pure milk itself*, with the addition of sugar only. There is no loss of any nutritive material, a fact of which we can always be assured, for the article cannot be produced except from *fresh* milk, as any change in the character of the original fluid, either by spontaneous decomposition, or otherwise, must spoil the result."

As the Committee observe, there is every inducement on the part of the manufacturer, to use the richest milk in its preparation, as such yields the largest product. We quote the concluding remarks of the Committee, describing this substance and its capabilities as a substitute for milk:

"'Blatchford's Solidified Milk' comes to us mainly in the form of a tablet, covered with tin-foil. It has a light yellow, slightly mottled appearance, is of very firm texture, but yields readily to the knife or grater. Each tablet weighs a pound, and will make in solution five pints of rich milk. When pulverized, it is readily soluble in hot or tepid water, while cold water requires rather longer time, but the solution is perfect in either. The tepid solution approaches nearer the standard of natural milk. The only objection, besides that of the presence of sugar, which can be made to it is an empyreumatic flavor somewhat similar to that of boiled milk, which it receives in the process of manufacture. This varies in degree, but is much less distinct when the solution is made with cold than with hot water, and in the preparation of custards, puddings, arrow-root, wine whey, ice creams, &c., in all of which your committee have practically tested it, it disappears. To many persons this flavor is not objectionable, and with many others, the palate soon becomes reconciled to it, and in a short time fails to recognise it. By contemplated improvements in the apparatus for manufacturing it, this objection is expected to be entirely obviated.

"A solution in cold water, allowed to stand sufficiently long, will exhibit a surface of rich cream, much more abundant than is found in the same quantity of milk carefully selected in the city; from this cream your committee have caused good butter to be made, from which all traces of sugar are easily washed away, showing that this substance is only mechanically, and not chemically, incorporated with the milk constituents. In solution, it does not acidify so soon as the milk of city consumption.

"Besides the hard tablet, the solidified milk is also furnished in a granular form, inclosed in cans; it is thus more convenient for use, and will doubtless keep sweet for many months, though probably more liable to change than in the other form.

"With regard to the economy of its use for ordinary purposes in families, its cost (25 cents a pound) might appear to be a bar to its general introduction. But when it is considered that the milk thus made is much superior in quality to that commonly found in this city, and that the sugar it contains

renders necessary so much less of that substance in its application to various uses, to say nothing of the satisfaction derived from the assurance of its purity and healthfulness, the cost is quite balanced. But as an article of diet in sickness, considerations of economy become insignificant in comparison with purity and high nutritive character, and your committee deem it but a duty to their fellow practitioners, to call their attention to it, as a valuable adjunct in the sick room, especially in the convalescence of children."

An Investigation into the Facts and Theories of Fermentation and Putrefaction. By HENRY PEMBERTON, Practical and Analytical Chemist. Medical Examiner, for May, pp. 257-295.

We call the attention of our readers to the above essay, on one of the most obscure, and at the same time interesting subjects that appertains to chemistry on the one hand, and medicine on the other, entering as it does, so much in organic chemical reaction in disease, and in the cause of disease by miasmatic influence. We hope to be able to present our readers with the chief facts, brought forward by Mr. Pemberton, in our next number.

An Outline of Medical Chemistry for the use of Students. By B. HOWARD RAND, A.M., M.D., &c. Philadelphia, Lindsay & Blakiston. 1855. pp. 259; 12mo.

Chemistry has grown into proportions so extensive and complicate, that to get even within the threshold of the subject, the medical student is compelled to give so large a share of his attention, that all serious expectation of mastering its details, as presented in the more complete treatises of Graham, Kane, and others, during the distraction occasioned by the more (medically) prominent branches of anatomy, materia medica, and practice, is frequently abandoned. To meet this deficiency several smaller works have appeared, more or less extended as regards their grasp of the subject, and the little work of Dr. Rand belongs in the category. If we understand the author, his object has been to present the primary and important facts of chemistry, philosophical and material, in so condensed a form, and so stripped of complexity of details, that the student may get a correct outline *idea* of the subject, be conscious of the ground plan and leading points of the superstructure, so as to be able in his subsequent reading to intelligibly refer what he learns to its proper position, and not get confused. It is in fact to be an auxiliary of the lecturer, who is expected to fill up the details in his teachings.

Although much condensed, Dr. Rand's book embraces a large number of important facts in the chemistry of bodies used in medicine, organic and inorganic, and by the judicious use of symbolic formulae, much exact information is conveyed. It will certainly find many admirers among the extensive class of persons to whom it is specially addressed.